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Proposed Implementation Plan for the Control of Particulates and Sulfur Oxides

for the
Commonwealth of Kentucky Portion
of the
Metropolitan Cincinnati Interstate Air Quality Control Region

September 1970

prepared for
National Air Pollution Control Administration

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PROPOSED IMPLEMENTATION PLAN FOR THE CONTROL OF PARTICULATES AND SULFUR OXIDES FOR THE COMMONWEALTH OF KENTUCKY PORTION OF THE METROPOLITAN CINCINNATI INTERSTATE AIR QUALITY CONTROL REGION

SEPTEMBER 1970

Prepared For
National Air Pollution Control Administration

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1. DESCRIPTION OF THE REGION

1.1 GENERAL CHARACTERISTICS

The Metropolitan Cincinnati Interstate Air Quality Control Region (MCIAQCR) was designated by the Secretary of the Department of Health, Education and Welfare on May 2, 1969. The Region is comprised of approximately 3000 square miles of land area located in the extreme southwestern portion of Ohio and the adjacent state of Indiana and the Commonwealth of Kentucky (Figure 1-1). There is a total of nine counties, including the territorial areas of all municipalities within the counties in the MCIAQCR, namely:

- Indiana
  - Dearborn County
  - Ohio County
- Kentucky
  - Boone County
  - Campbell County
  - Kenton County
- Ohio
  - Butler County
  - Clermont County
  - Hamilton County
  - Warren County

Current estimates place the population of the Region at approximately 1.5 million persons, of which about 500,000 reside within the City of Cincinnati. The population within the Region is centered on Cincinnati with nearly two-thirds of the populace living with 15 miles of the confluence of the Ohio and Licking Rivers. Projections of future growth indicate that the total population of the Region should increase to 1.8 million by 1975 and 2.0 million by 1980.

The MCIAQCR is primarily an industrial area with about one-third of the total employment in manufacturing industries. The principal industries are aerospace, soap products, automotive, primary metals, fabricated metals, petroleum products, rubber, plastics, chemical, and machine tool manufacture. Industry is concentrated along the Mill Creek, Great Miami and Little Miami Rivers in Ohio, and the Licking River in Kentucky.

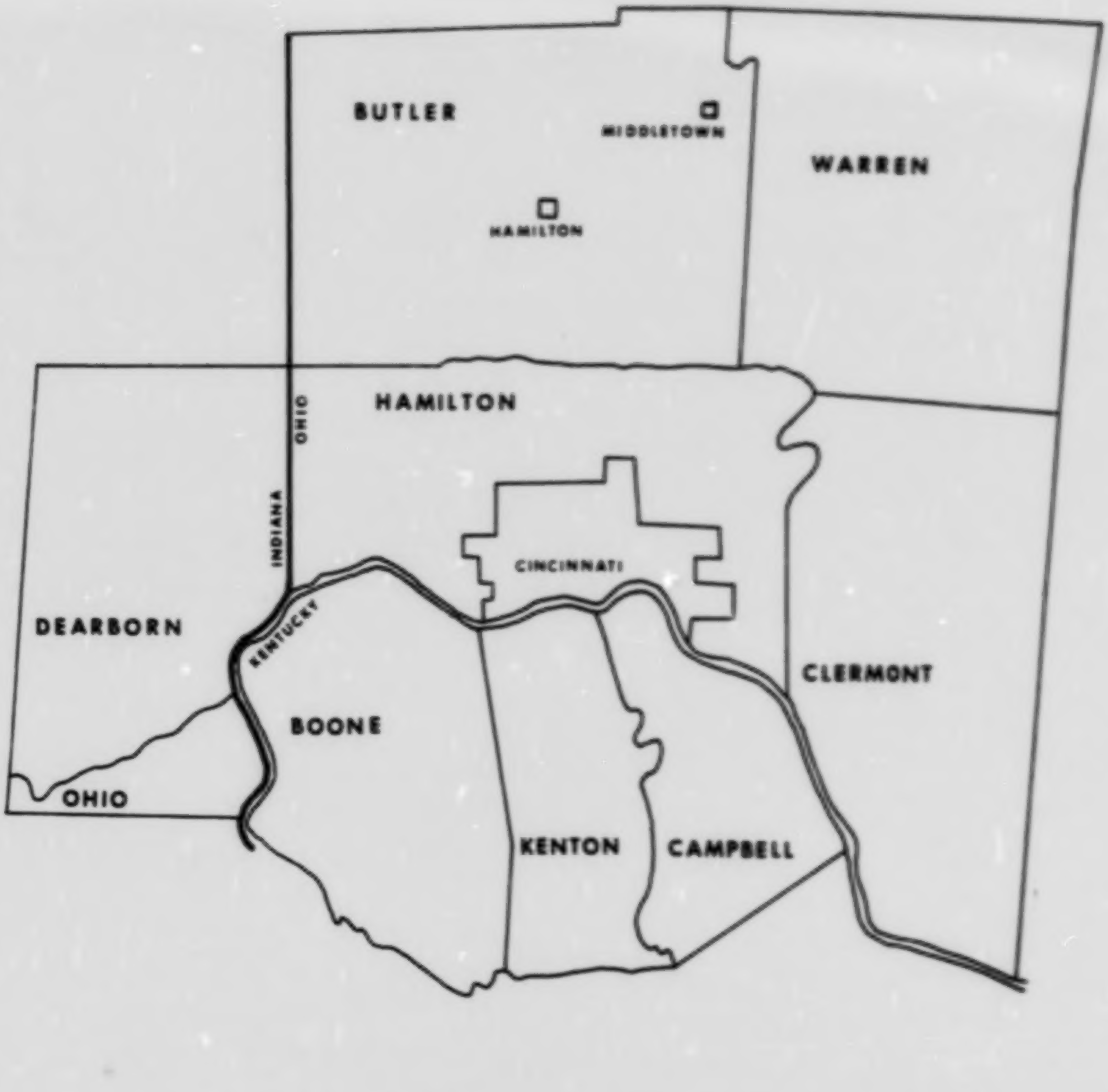


Figure 1-1. METROPOLITAN CINCINNATI INTERSTATE
AIR QUALITY CONTROL REGION

The major sources of sulfur oxides are related to fuel combustion with the most significant sources being the several large electric generating plants located in the Region. Fuel combustion also contributes heavily to the total emission of particulates, and again the electric power generating plants represent major point sources. Significant amounts of particulates are also emitted by industrial fuel combustion sources as well as industrial process losses. Solid waste disposal by open burning is permitted within the Region; and as a result, such sources emit large quantities of particulate pollutants.

1.2 TOPOGRAPHICAL FEATURES

The area in and around Cincinnati consists of an upland plain about 900 feet above sea level which is cut by the flood plain of the Ohio River. Hills and valleys are more pronounced in the southern and western portions of the Region. The basin area within the flood plain of the Ohio River is surrounded by steep bluffs rising 200 to 400 feet to the general level of the upland plain. These bluffs are cut frequently by the valleys of small streams which produce a setting of promontories and steep hills. In general, throughout the Region the hills and valleys have only a minimal effect on air movement; however, within the steep walled meandering valleys, the air flow is strongly influenced by the surrounding terrain.

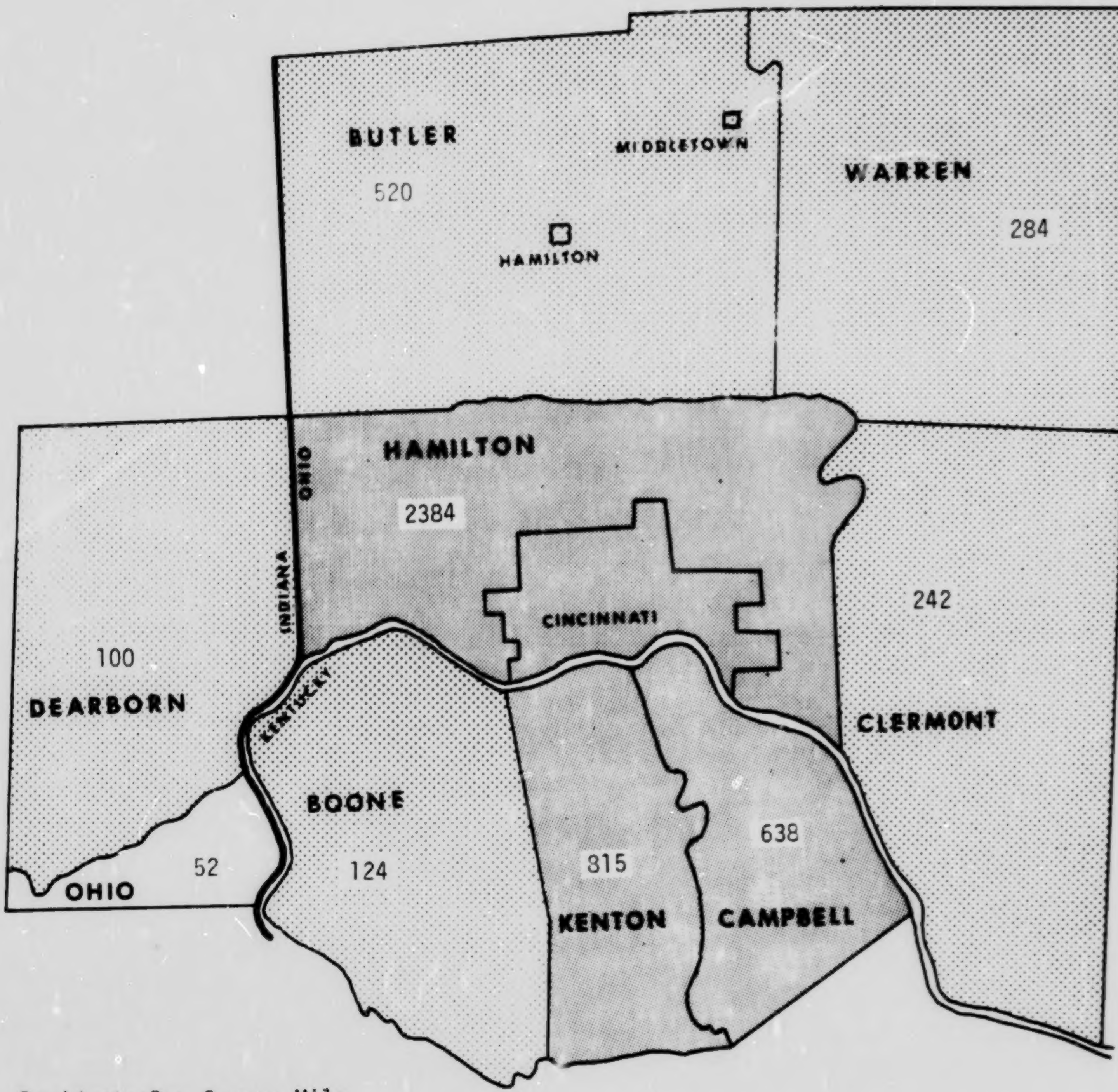
1.3 DEMOGRAPHY

Population statistics for each county and for six principal cities within the MCIAQCR are presented in Table 1-1. The City of Cincinnati with a population exceeding 500,000 accounts for one-third of the total population of the Region. The four Ohio counties include over 80 percent of the population in the MCIAQCR. Population density for the entire Region averages 494 persons per square mile but varies from 52 persons per square mile in Ohio County, Indiana, to 2384 persons per square mile in Hamilton County, Ohio. The counties of Boone in Kentucky and Warren in Ohio showed the greatest growth in the ten-year period 1960 - 1970. (Figure 1-2)

	Increase (%)	Land Area (sq.mi.)	1960	1965	Estimated 1970	Estimated 1975	1970 Density Persons/Sq.Mi.	Percent of Total Population
Indiana	3.0	739	32,936	34,301	35,320	36,340	48	2.0
Dearborn Cty.	3.0	306	28,771	29,901	30,800	31,700	100	1.8
Ohio County	2.7	87	4,165	4,400	4.520	4.640	52	0.2
Kentucky	7.3	563	230,289	242,584	260,300	278,400	462	15.1
Boone County	22.6	249	22,033	25,112	30,800	36,700	124	1.8
Campbell County	5.2	149	87,119	90,336	95,000	99,800	638	5.5
Kenton County	6.6	165	121,137	127,136	134,500	141,900	815	7.8
Ohio	9.1	1751	1,214,000	1,319,421	1,439,500	1,550,000	822	83.0
Butler County	10.6	471	199,897	221,194	244,700	268,300	520	14.2
Clermont Cty.	14.9	458	80,874	96,697	111,100	125,600	242	6.3
Hamilton Cty.	5.6	414	867,214	934,301	987,200	1,040,200	2384	56.9
Warren Cty.	25.0	408	6[illegible],015	77,229	96,500	115,900	284	5.6
MCIAQCR		3032	1,477,225	1,606,306	1,735,120	1,864,740	572	

Source: Ohio, Kentucky, Indiana Regional Planning Authority

Table 1-1. POPULATION GROWTH BY COUNTY AND FOR SELECTED CITIES
1960 - 1980



Residents Per Square Mile

- ▨ more than 500
- ▒ 100 to 500
- ☐ less than 100

Figure 1-2. POPULATION DENSITY IN MCIAQCR

1.4 METEOROLOGICAL DATA

1.4.1 Climatology

Climate of the MCIAQCR is typically continental with a wide range of temperatures from winter to summer. Summers are warm and rather humid, with temperatures reaching 100°F or more one year out of three. Above 90°F temperature occurs about 28 days each year. Winters are moderately cold with frequent periods of extensive cloudiness. However, during an average winter the temperature reaches zero or below only on two days.

The Region is subjected to frequent changes in the weather due to the passage of numerous cyclonic storms in the winter and spring and thunderstorms during the summer. Minimum precipitation occurs in the fall. Nearly one-third of the yearly precipitation occurs during the summer months when prevailing south-to-southwest winds on the western sides of the Bermuda high carry warm, moist air from the Gulf of Mexico up the Mississippi and Ohio Valleys. South-to-southwest flow predominates throughout the year with average wind speeds at Greater Cincinnati Airport between 10 to 11 m.p.h. from November to April, between 7 to 9 m.p.h. from May to September, and 9 m.p.h. over the year. Wind speeds within the city limits average about 2 to 3 m.p.h. lower than these recorded at the Airport.

Table 1-2 gives estimates of monthly mean afternoon mixing heights in meters above ground, averaged over each month and the year as a whole. These data, interpolated from values computed by Holzworth[1] for the nearest surrounding radiosonde observation stations, Joliet, Illinois, Pittsburgh, Pennsylvania, and Nashville, Tennessee, cover the 10-year period 1946 - 1955. Table 1-3 shows seasonal and annual frequencies of noctural inversions, nighttime cloud cover equal to or less than 3/10, nighttime wind speed equal to or less than 7 m.p.h. The data, adapted from Hosler[2], apply to Greater Cincinnati Airport. In the city, nocturnal inversions occur less frequently than at the airport despite the higher frequency of light winds.

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[1] Holzworth, G.C., "Estimates of Mean Maximum Mixing Depths in the Contiguous United States", Monthly Weather Review, 92, 5, 235-242 (May 1964).

[2] Hosler, C.R., "Low-Level Inversions Frequency in the Contiguous United States", Monthly Weather Review, 89, 319-339 (September 1961).

January	February	March	April	May	June	July	August	September	October	November	December
500	570	1020	1140	1250	1320	1550	1440	1200	950	670	520

Annual
1010

Table 1-2. MONTHLY MEAN AFTERNOON MIXING HEIGHTS (meters) FOR THE METROPOLITAN CINCINNATI INTERSTATE AIR QUALITY CONTROL REGION

	Winter	Spring	Summer	Autumn	Annual
(1) Inversions	25*	28	32	37	30
(2) Cloud Cover Equal to or Less Than 3/10	26	36	55	54	42
(3) Winds Equal To Or Less Than 7 m.p.h.	31	38	69	50	47

* Percent of Total Hours

Table 1-3. SEASONAL AND ANNUAL AVERAGE FREQUENCY OF OCCURRENCE OF CONDITIONS FAVORABLE FOR HIGH POLLUTION VALUES

1.4.2 Data for the Atmospheric Dispersion Model

The dispersion model used for the development of control strategies, discussed in Section 2, requires input of the following meteorological data:

- Wind: direction and speed
- Atmospheric stability
- Average mixing height

Wind and stability are combined in a 480-unit, three-dimensional frequency distribution based on 16 wind directions, six wind speed classes, and five stability categories. The data used for this analysis are listed in the Appendix in two tables:

- Table A-1. DATA COVERING THE YEAR 1965 THROUGH 1969, TO ESTIMATE AVERAGE ANNUAL GROUND LEVEL POLLUTANT CONCENTRATIONS
- Table A-2. DATA COVERING THE THREE MONTHS NOVEMBER 1969 THROUGH JANUARY 1970, FOR VALIDATING THE MODEL

Average annual and winter afternoon mixing heights for the five-year period were determined to be 1315 meters and 680 meters, respectively. These values, derived from radiosonde data for Dayton, Ohio, are higher than interpolated climatological data given in Table 1-2, which cover an earlier and longer period of record.

The model also provides for a computation of effective stack height based on Holland's Plume Rise Equation.[3] Meteorological data required for this computation include barometric pressure, here assumed to be 1000 millibars, and mean ambient temperature, assumed to be 32°F, or 273°K.

1.5 EMISSION INVENTORY

In October 1968, the Division of Air Quality and Emission Data, National Air Pollution Control Administration, completed an inventory of all sources of air pollution in the nine-county MCIAQCR. A partial emission inventory for the City of Cincinnati was completed by the Division of Air Pollution Control and Heating Inspection in December 1968. Following this, in October 1969, the Kentucky Air Pollution Control Commission conducted an inventory of sources of pollution for Boone, Campbell and Kenton Counties. The APC agencies for Ohio and Indiana conducted inventories in December 1969.

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[3] Holland, J.Z., "A Meteorological Survey of the Oak Ridge Area," USAEC Report ORO-99, Oak Ridge National Library, 1953.

Information derived from all of the above surveys was used to compile the comprehensive emission inventory upon which this Implementation Plan is based. All sources emitting more than 10 tons/year of pollutants were treated as point sources. Those with emissions less than 10 tons/year were included with the area emission sources.

The Universal Transverse Mercator (UTM) grid system was used to locate all sources of pollution in the Region. The basic grid for the Region is 100 x 100 kilometers (Figure 1-3). All points sources are located by their easting and northing coordinates. Area sources of pollution are computed for grids varying in size from 2.5 x 2.5 KM to 20 x 20 KM, the smaller grid size being used in areas with high emission densities. Area source grids are located by the easting and northing coordinates of the lower left corner of the grid.

A summary of all point and area sources of emission is presented in Table 1-4 for sulfur oxides and in Table 1-5 for particulates.* A total of 389,000 tons of sulfur oxides are emitted annually from all sources within the Region. Fuel combustion for stationary sources accounts for nearly 375,000 tons or 96.4 percent of sulfur oxide emissions. More than 82 percent of all sulfur oxides emitted in the Region comes from electric power generating plants. Even though the MCIAQCR is basically a manufacturing center, industrial process losses account for only 2 percent of the total sulfur oxide emissions.

In excess of 172,000 tons of particulate pollutants are emitted into the atmosphere within the MCIAQCR each year. Again, fuel combustion sources represent the dominant contributors of particulates, accounting for 68 percent (117,600 tons/year). Electric power generating plants are the single most important type of source in that they emit 80,8000 tons/year or about 47 percent of all particulates. Industrial process losses emit 25,000 tons and solid waste disposal 20,800 tons of particulates each year. For solid waste disposal, open burning accounts for 18,400 tons of particulates each year. The geographical distribution of point sources emitting more than 10 tons per year is presented in Figure 1-4. It is apparent that the majority of the point sources are located in Ohio with the greatest concentration of point sources in Hamilton County.

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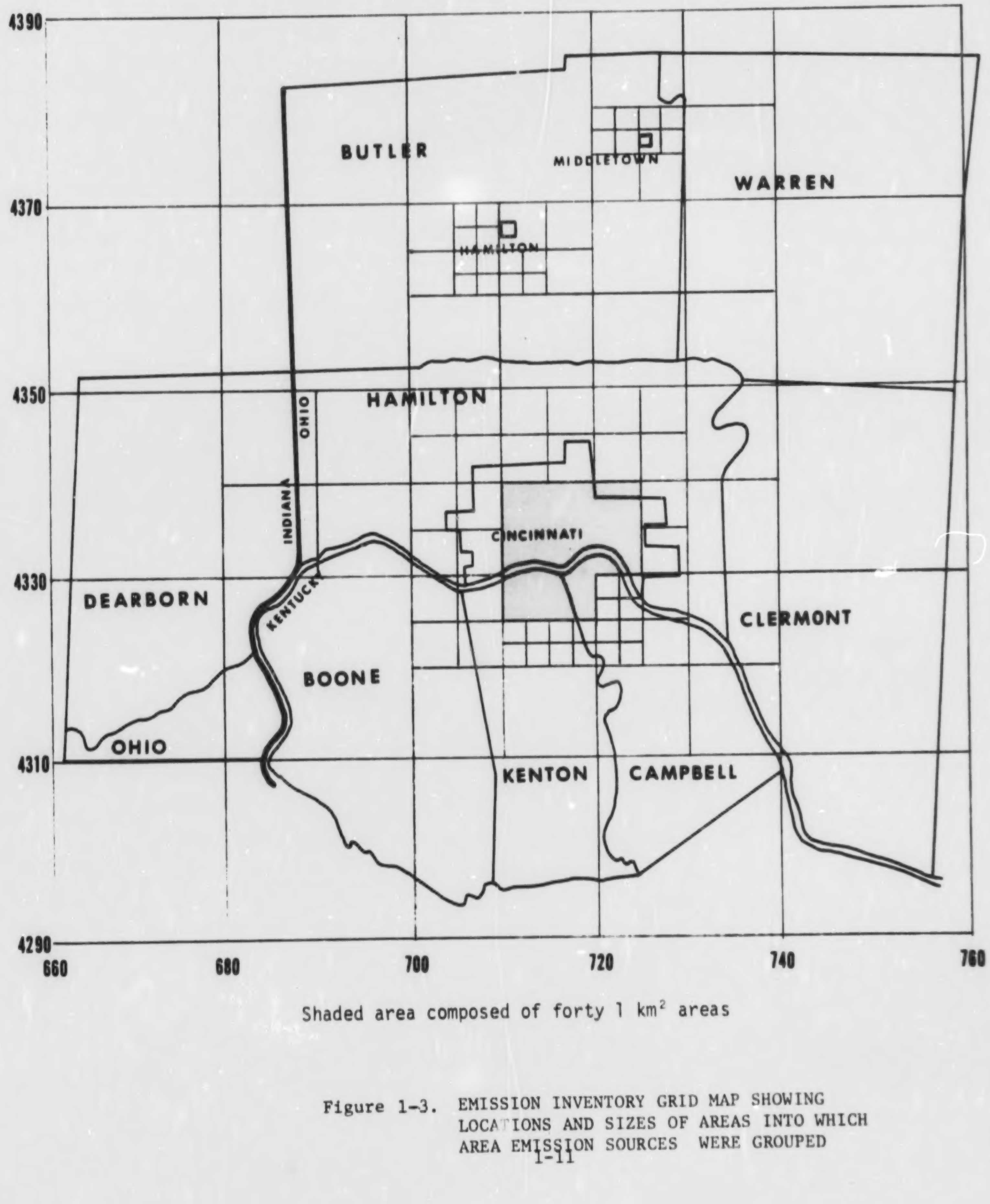
*The complete emission inventory has been supplied to NAPCA and only summary tabulations appear in this report.



Shaded area composed of forty 1 km^2 areas

Figure 1-3. EMISSION INVENTORY GRID MAP SHOWING LOCATIONS AND SIZES OF AREAS INTO WHICH AREA EMISSION SOURCES WERE GROUPED

Source Category	POLITICAL JURISDICTIONS				
	Cincinnati	Indiana	Kentucky	Ohio	TOTAL
Fuel Combustion, Stationary	10,845.88	126,081.09	2,496.73	230,716.90	370,140.60
Apartments, Commercial, Government	5,765.54	463.38	1,910.15	4,956.40	13,068.47
Industrial	4,463.39	1,689.20	271.78	28,253.75	34,678.12
Power Plants	0	123,844.50	0	196,041.50	319,886.00
Residential	616.95	111.01	314.80	1,465.25	2,508.01
Fuel Combustion, Mobile	1,299.65	149.94	544.97	2,895.74	4,890.30
Gasoline Powered	984.09	107.90	404.55	2,153.08	3,649.72
Diesel Powered	315.56	42.04	140.42	742.66	1,240.68
Industrial Process Emissions	0	0	0	8,584.80	8,584.80
Solid Waste Disposal	550.81	57.33	97.16	2,552.54	3,257.84
Open Burning	113.23	57.33	97.16	2,453.99	2,721.71
Industrial	110.23	37.33	28.10	335.14	510.80
Commercial, Government	3.00	5.40	54.46	224.50	287.36
Municipal	0	14.60	14.60	1,894.35	1,923.55
Incineration	437.58	0	0	98.55	536.13
Industrial	0	0	0	0	0
Commercial, Government	47.03	0	0	0	47.03
Municipal	309.55	0	0	98.55	489.10
GRAND TOTAL	12,696.34	126,288.36	3,138.86	244,749.98	386,873.54

Table 1-4. EXISTING SULFUR OXIDE EMISSIONS IN THE MCIAQCR BY SOURCE CATEGORY AND LOCATION BASED ON 1969 EMISSION INVENTORY (tons/year)

Source Category	Cincinnati	Indiana	Kentucky	Ohio	TOTAL
	POLITICAL JURISDICTIONS				
Fuel Combustion, Stationary	6,302.41	25,092.55	1,251.27	85,965.89	118,602.12
Apartments, Commercial, Government	2,538.80	190.72	833.93	2,166.12	5,729.57
Industrial	3,431.91	1,222.00	265.13	25,119.54	30,038.58
Power Plants	0	23,633.75	0	58,104.35	81,738.10
Residential	331.70	36.08	152.21	575.88	1,095.87
Fuel Combustion, Mobile	2,179.90	259.47	1,692.04	4,913.08	9,044.49
Gasoline Powered	1,312.11	143.86	539.39	2,870.77	4,866.13
Diesel Powered*	867.79	115.61	1,152.65	2,042.31	4,178.36
Industrial Process Emissions	365.00	91.25	7,489.80	16,968.85	24,914.90
Solid Waste Disposal	3,677.59	1,201.37	1,905.37	14,006.54	20,790.87
Open Burning	1,887.50	1,201.37	1,905.37	10,929.59	18,424.08
industrial	1,837.39	622.27	468.50	5,585.67	8,513.83
commercial, government	50.11	90.00	907.62	4,964.32	6,012.05
municipal	0	489.10	529.25	379.60	3,898.20
Incineration	1,790.09	0	0	3,076.95	2,166.04
industrial	0	0	0	0	0
commercial, government	235.19	0	0	0	235.19
municipal	1,554.90	0	0	3,076.95	1,930.85
GRAND TOTAL	12,524.90	26,634.64	12,338.48	121,854.36	173,352.38

Table 1-5. EXISTING (1969) PARTICULATE EMISSIONS IN THE MCIAQCR BY SOURCE CATEGORY (tons/year)

*Includes particulate emissions from Greater Cincinnati Airport in Kentucky

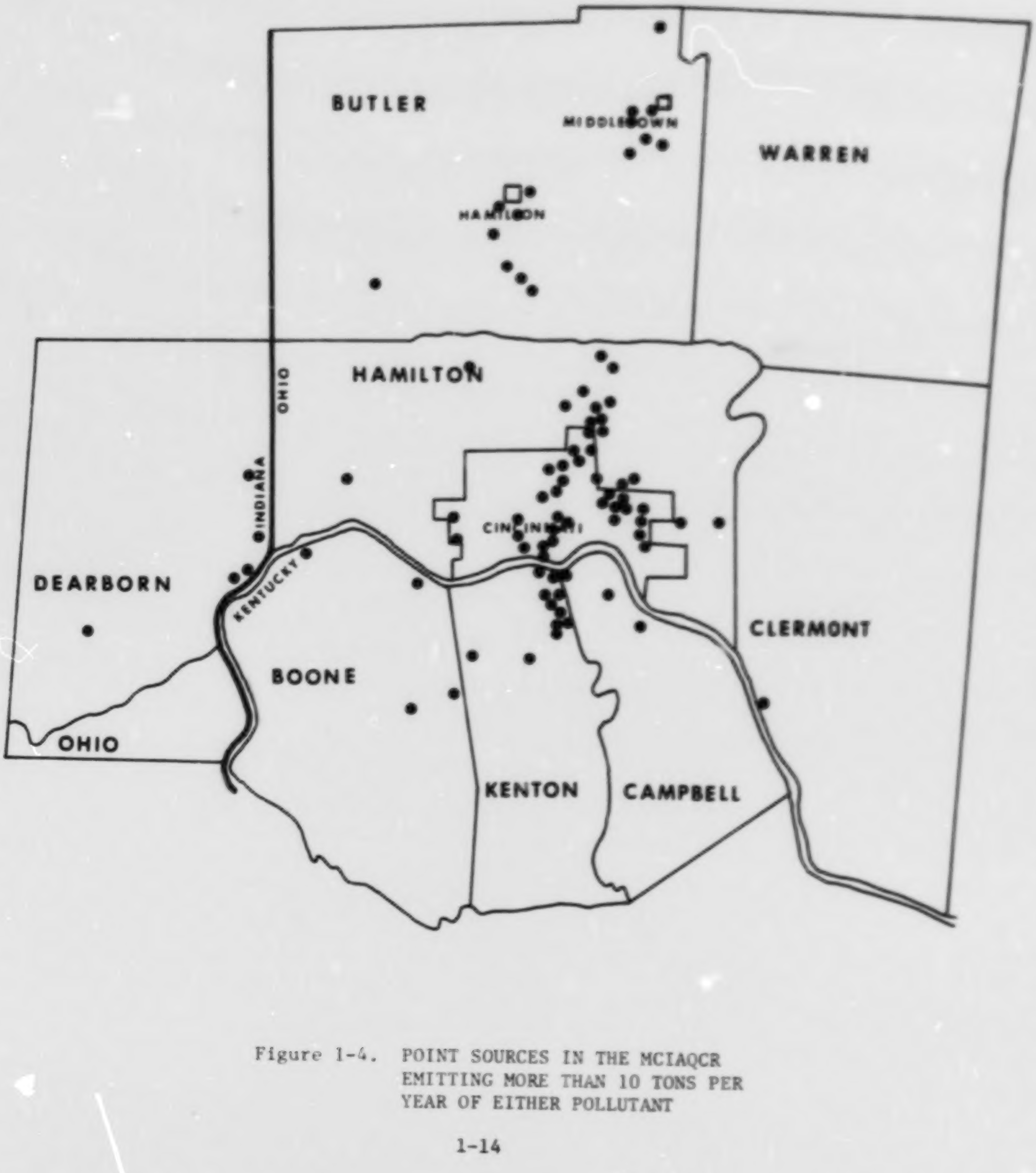


Figure 1-4. POINT SOURCES IN THE MCIAQCR EMITTING MORE THAN 10 TONS PER YEAR OF EITHER POLLUTANT

There are two power generating plants in Dearborn County, Indiana, and one in Clermont County, Ohio. Emission sources located in the Cities of Hamilton and Middletown, Ohio, are shown by separate clusters to the north of the City of Cincinnati.

Contributions from area sources of emissions are presented in terms of emission densities (tons/day/km^2) for sulfur oxides (Figure 1-5) and particulates (Figure 1-6). The two pollutants show the same geographical pattern with areas of highest emission densities centered on the City of Cincinnati and the northern Kentucky cities of Covington and Newport. The Cities of Hamilton and Middletown in Butler County also show up as significant area sources for both SO_2 and particulates. Grid number 223 in Boone County shows relatively high particulate emissions as a result of aircraft activity at the Greater Cincinnati Airport.

1.6 REGIONAL AIR QUALITY

1.6.1 Sampling Stations

Measurements of ambient concentrations of particulates and sulfur oxides have been made at various locations in the MCIAQCR since 1957. For the most part, the sampling sites were located in or near the City of Cincinnati and were operated for periods of one year or less on a project basis. As a result, there is a paucity of data for the Region as a whole.

Table 1-6 lists the most recent sampling sites, identified by site numbers used on NAPCA and state and local programs. Locations are shown in UTM coordinates. At four locations, three in Cincinnati and one in Covington, measurements made under federally sponsored programs span a number of years. Station 106, operating under the Continuous Air Monitoring Program (CAMP) has an uninterrupted record dating back to 1961. Three stations, Numbers 98 and 109 in Cincinnati and 105 in Covington, are part of the National Air Sampling Network (NASN); the record for Station 109 dates back to 1957.

Further data on sampling stations are given in connection with specific projects and results discussed below.

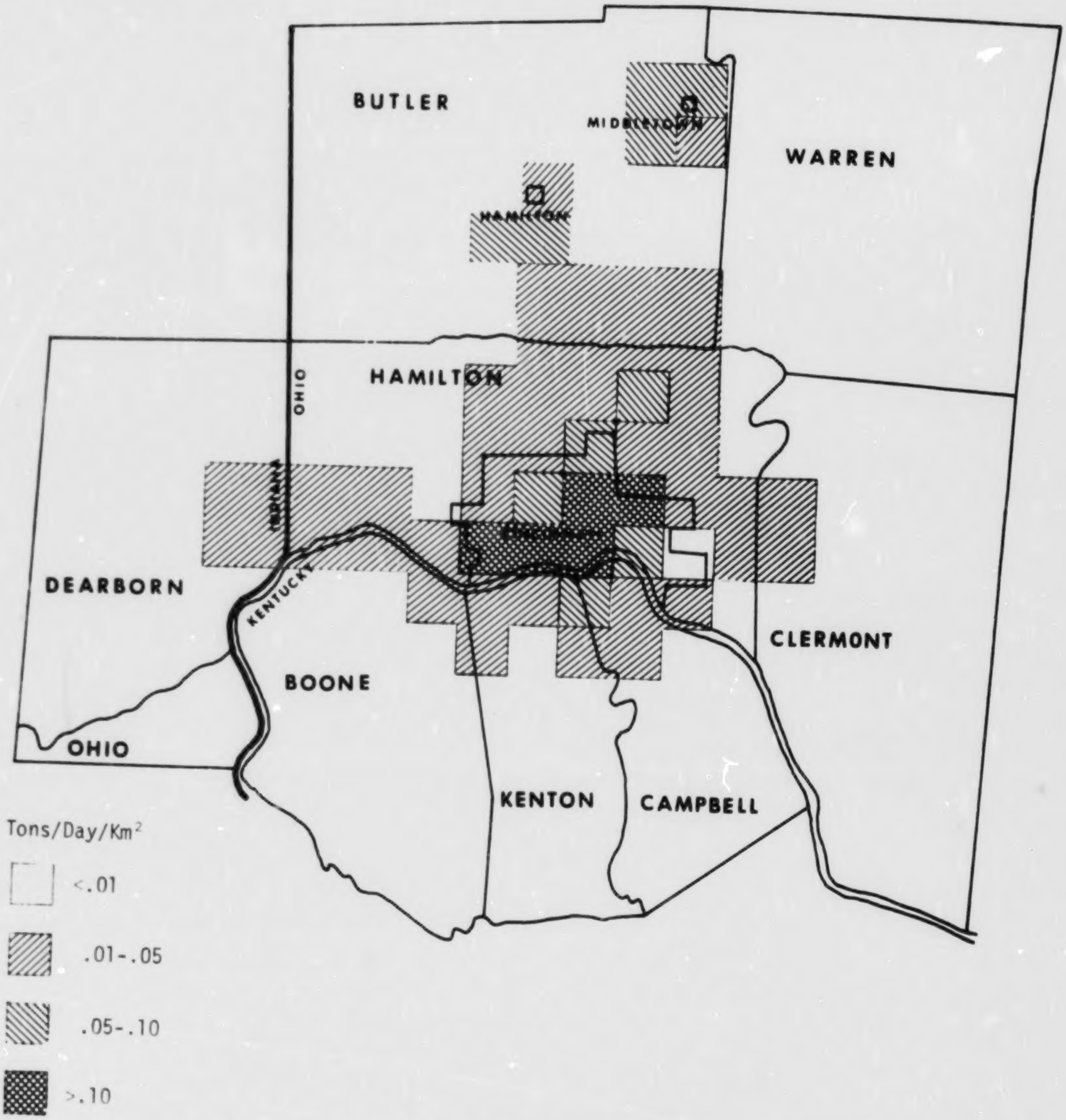


Figure 1-5. SULFUR OXIDES EMISSION DENSITY BY GEOGRAPHICAL AREAS

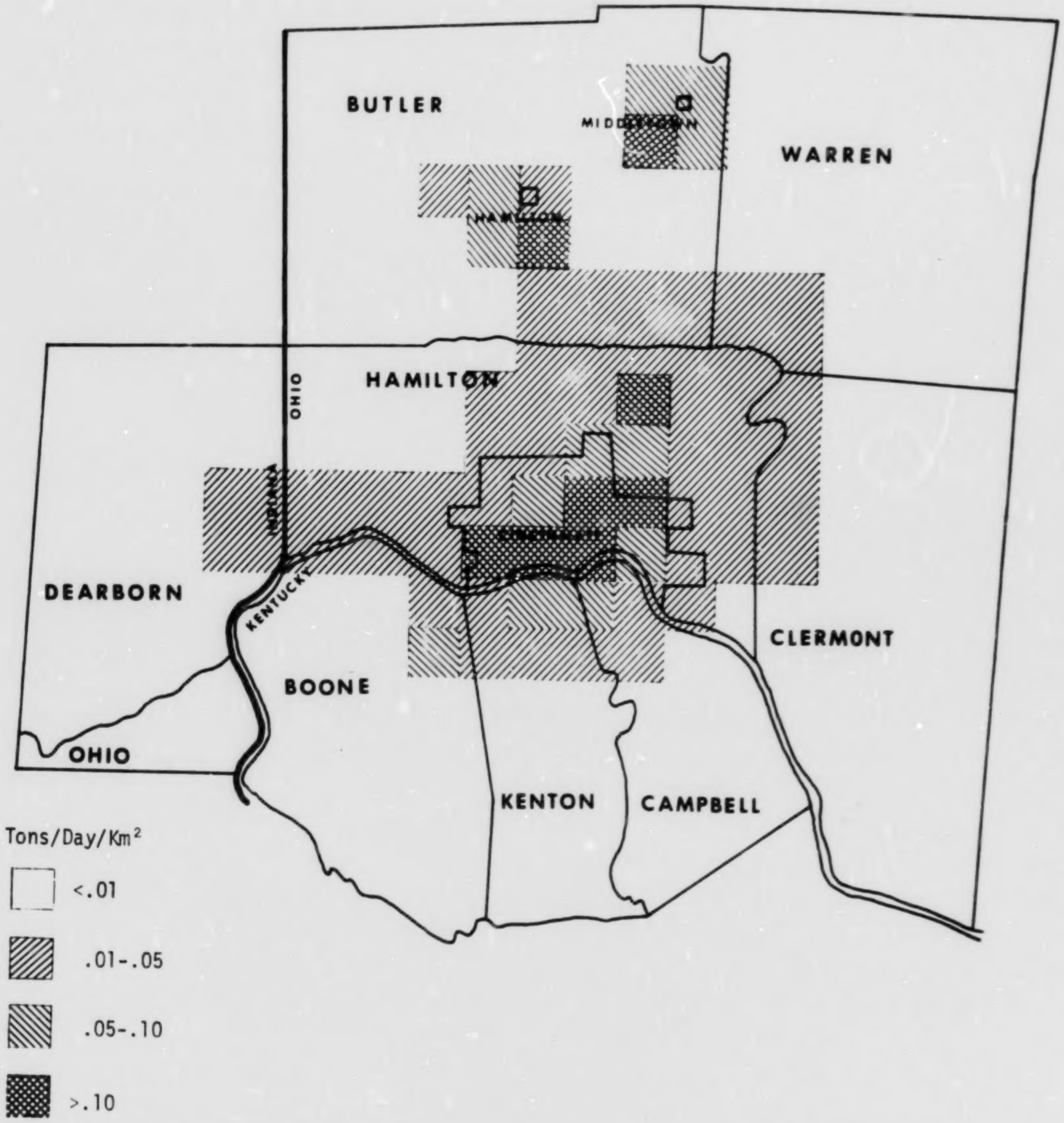


Figure 1-6. PARTICULATE EMISSION DENSITY BY GEOGRAPHICAL AREAS

Table 1-6. MCIAQCR SAMPLING STATIONS

STATION NUMBER		COORDINATE (kilometer)			LOCATION	
NAPCA	State & Local	Easting	Northing	Name	City or County	State
10		721.80	4331.90	Tennyson Pumping Station	Cincinnati	Ohio
39		716.20	4329.50	Newport Mall	Newport	Kentucky
42		707.00	4321.80	Erlanger City Hall	Erlanger	Kentucky
70	2	694.67	4335.75	North Bend Fire Station	North Bend	Ohio
71	3	701.27	4348.52	New Baltimore Fire Station	New Baltimore	Ohio
72	6	707.39	4340.25	Monfort Heights Fire Station	Monfort Heights	Ohio
73	13	709.37	4331.84	Seaton High School	Hamilton County	Ohio
74	16	717.73	4341.15	Seymour Fire Station	Hamilton County	Ohio
75	17	717.55	4339.31	Laidlaw	Cincinnati	Ohio
76	20	723.69	4349.82	Sharonville Elem. School	Sharonville	Ohio
77	21	719.81	4344.81	Lockland Fire Station	Lockland	Ohio
78	23	722.24	4339.72	Nativity Elem. School	Hamilton County	Ohio
79	31	729.39	4327.69	Anderson Township School	Hamilton County	Ohio
80	30	728.13	4334.13	Newton Elem. School	Newton	Ohio
81	36	740.94	4323.40	Amelia Elem. School	Amelia	Ohio
82	37	735.58	4314.80	New Richmond Fire Station	New Richmond	Ohio
83	43	709.75	4363.87	City Building	Hamilton	Ohio
84	44	708.42	5362.39	Monroe Elem. School	Hamilton	Ohio
85	45	711.69	4366.20	Hamilton No. Water Treatment Plant	Butler County	Ohio

Table 1-6. MCIAQCR SAMPLING STATIONS (continued)

STATION NUMBER		COORDINATE (kilometer)			LOCATION	
NAPCA	State & Local	Easting	Northing	Name	City or County	State
86	46	712.20	4364.40	Grant School	Hamilton	Ohio
87	47	712.03	4361.45	Van Buren Elem. School	Hamilton	Ohio
88	52	723.57	4376.70	Middletown High School	Middletown	Ohio
89	53	723.69	4374.77	Garfield Elem. School	Middletown	Ohio
90	54	727.75	4378.12	Manchester Jr. High School	Middletown	Ohio
91	55	728.42	4376.08	Creekview Elem. School	Middletown	Ohio
92	56	725.46	4374.50	Pioneer Standard Electronics	Middletown	Ohio
93	58	733.05	4381.58	Franklin High School	Franklin	Ohio
94	59	740.12	4368.94	Lebanon High School	Lebanon	Ohio
98	2	711.60	4341.60	College Hill	Cincinnati	Ohio
105		715.60	4328.80	Covington NASN	Covington	Kentucky
106		714.40	4331.60	CAMP	Cincinnati	Ohio
107		712.20	4331.60	Waste Water Treatment Plant	Cincinnati	Ohio
109		715.00	4331.20	Library	Cincinnati	Ohio
110		685.00	4331.10	Greendale Utilities	Greendale	Indiana
111		714.30	43333.30	WLW TV Tower	Cincinnati	Ohio
112		687.10	4329.30	Lawrenceburg Police & Fire Station	Lawrenceburg	Indiana
113		615.10	4329.20	IRS Building	Covington	Kentucky
114		742.10	4322.40	Volunteer Fire Department	Amelia	Ohio
202		712.80	4335.40	Highway Maintenance	Cincinnati	Ohio

Table 1-6. MCIAQCR SAMPLING STATIONS (continued)

STATION NUMBER NAPCA	STATION NUMBER State & Local	COORDINATE (kilometer) Easting	COORDINATE (kilometer) Northing	Name	LOCATION City or County	State
203		725.30	4337.90	French Bauer (Dairy)	Cincinnati	Ohio
204		727.70	4340.40	Maderia Board of Education	Maderia	Ohio
207		719.10	4336.30	Norwood Fire Station #2	Norwood	Ohio
209		711.60	4336.70	Cincinnati Gas & Electric Substation	Cincinnati	Ohio
244		715.90	4326.70	Rockcastle Motor Sales	Covington	Kentucky
245		723.32	4376.96	City Building Annex	Middletown	Ohio

1.6.2 Regional Distribution of Particulate Pollutants

Figure 1-7 shows isopleths of average annual ground level concentrations of suspended particulates measured over a portion of the Region during 1967 to 1969. The observational records used to develop this figure include those of the CAMP and NASN stations and the combined data of several measurement programs irregularly spaced throughout the period. From Figure 1-7 it is apparent that areas of high pollution are centered on Cincinnati and Newport, Kentucky, the City of Hamilton and the vicinity of the Ohio and Indiana border near the Ohio River. It will also be apparent, from the table of Air Quality Standards in Section 1.6.4 infra, that these standards are being exceeded over a significant part of the MCIAQCR. These indications are further supported by a three-month study from November 1969 through January 1970, results of which are shown in Table 1-7. All measurements reported in micrograms per cubic meter were made by means of high volume samplers ("hi-vols"). At one site, in Newport, Kentucky, soiling index (smoke shade) measurements reported in COHs per 1000 linear feet were made on an AISI tape sampler. These units are not used for Air Quality Standards and no factor to convert them to equivalent micrograms per cubic meter is universallly agreed upon.

1.6.3 Regional Distribution of Sulfur Dioxide

Ambient air monitoring data for sulfur dioxide are scarcer than for particulates, both on a regionwide and a local basis. In recent years, however, several projects were undertaken to obtain measurements of sulfur oxides, using sulfation networks, wet impingers ("bubblers"), and continuous SO_2 analyzers. Figure 1-8 shows isopleths of annual average ground level concentrations of SO_2 derived from several projects in operation during 1968-1969. Table 1-8 gives results for the three-month period corresponding to Table 1-7. Table 1-9 also covers the period November 1969 through January 1970, but the data are measurements of sulfation taken from a close network of stations. The station numbers are different from those previously listed for the Region. Coordinates are given to the nearest kilometer, measured from the origin at (660.0, 4290.0) in the UTM system.

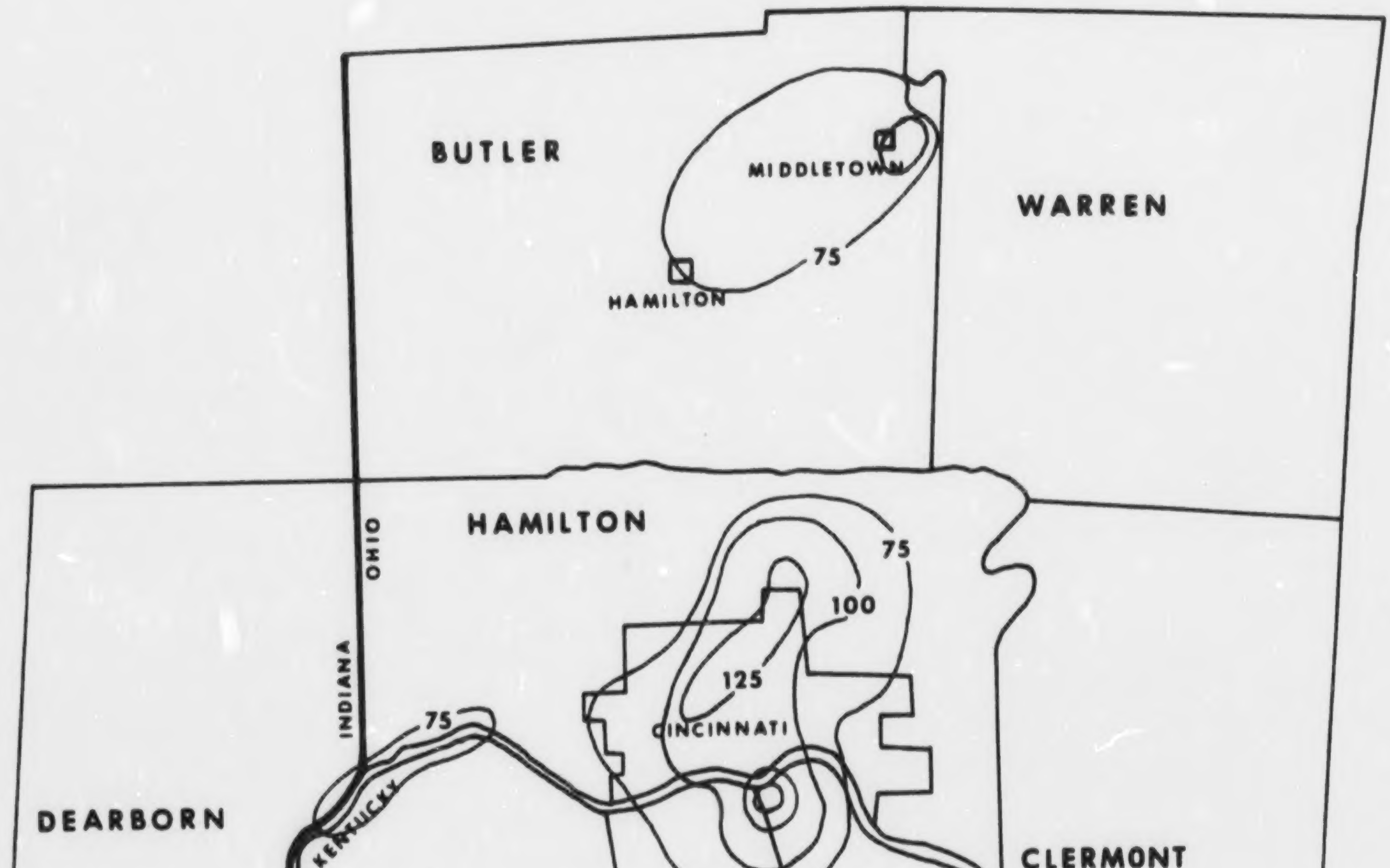


Figure 1-7. AVERAGE ANNUAL PARTICULATE CONCENTRATIONS DURING 1967 - 1969 (micrograms per cubic meter)

Table 1 - 7 QUARTERLY SUMMARY STATISTICS FOR
MCIAQCR STUDY, NOVEMBER 1969 - JANUARY 1970
POLLUTANT: PARTICULATES $\mu g/m^3$

				ARITHMETIC		GEOMETRIC	
STATION	NUMBER OF READINGS	MAXIMUM	MINIMUM	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION
10	31	178	24	77	34	70	1.55
39	29	342	59	162	67	148	1.54
42	29	191	19	62	35	55	1.67
70	30	221	24	78	42	69	1.62
71	30	191	25	71	40	63	1.62
72	30	228	28	74	44	65	1.64
73	30	263	33	70	48	61	1.60
74	28	248	30	119	66	102	1.79
75	28	281	25	126	71	108	1.78
76	30	154	27	75	32	69	1.53
77	30	426	35	136	95	111	1.90
78	30	225	11	95	42	85	1.73
79	30	108	16	53	20	50	1.45
80	31	122	25	63	24	59	1.46
81	21	131	12	67	34	58	1.78
82	29	143	28	82	34	74	1.64
83	28	244	27	85	56	73	1.73

Table 1 - 7 Continued

STATION	NUMBER OF READINGS	MAXIMUM	MINIMUM	ARITHMETIC MEAN	ARITHMETIC STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STANDARD DEVIATION
84	31	195	15	56	41	47	1.80
85	30	333	28	90	74	73	1.81
86	31	211	27	78	39	71	1.55
87	27	140	28	66	27	61	1.51
88	30	196	49	93	35	88	1.43
89	27	212	37	99	45	89	1.63
90	30	130	26	64	26	59	1.50
91	28	188	15	74	37	66	1.70
92	28	344	50	128	65	115	1.61
93	28	156	20	68	32	62	1.59
94	19	103	21	56	23	52	1.53
98	30	213	29	68	41	60	1.65
105	70	203	52	113	66	98	1.79
106	48	233	49	110	44	102	1.45
107	30	276	26	107	60	93	1.71
109	31	248	35	102	49	93	1.53
110	31	187	26	67	36	59	1.64
111	29	250	40	89	50	80	1.54
112	13	148	41	85	35	79	1.51

Table 1 - 7 Continued

STATION	NUMBER OF READINGS	MAXIMUM	MINIMUM	ARITHMETIC MEAN	ARITHMETIC STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STANDARD DEVIATION
113	28	219	31	89	46	79	1.58
202	31	443	39	135	86	117	1.68
203	25	160	31	92	31	87	1.43
204	22	228	48	95	40	89	1.44
207	27	244	42	100	47	91	1.54
209	30	211	30	83	47	73	1.64
244	24	196	50	105	36	99	1.40
			ADDENDUM				
		Pollutant:	Particulates	Units:	Soiling Index, COHs/1000 linear feet		
039	725	260	0.00	0.34	0.39	0.22	2.76

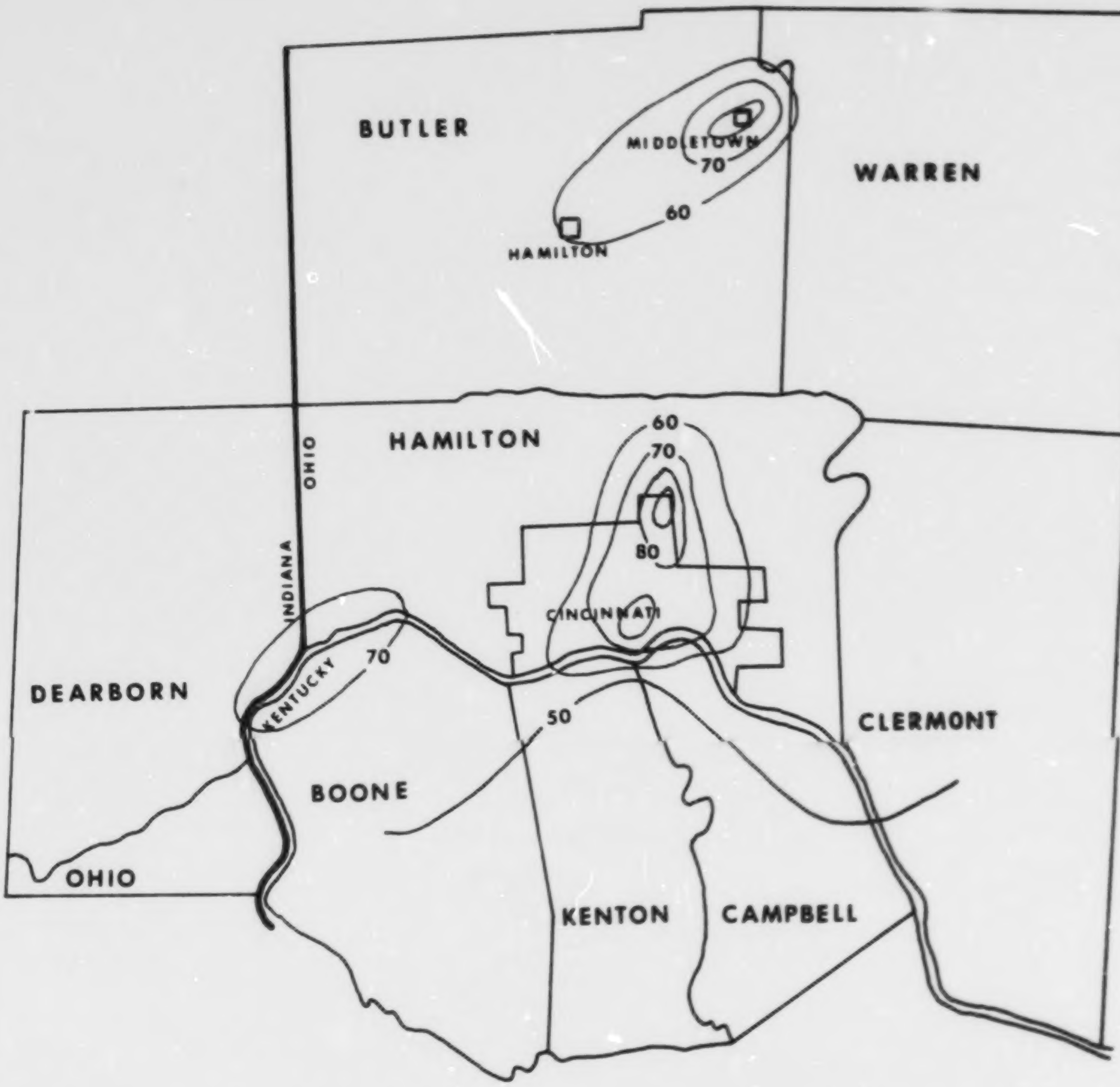


Figure 1-8. ANNUAL AVERAGE SO_2 CONCENTRATIONS DURING 1968-1969 (micrograms per cubic meter)

Table 1 - 8 QUARTERLY SUMMARY STATISTICS FOR
MCIAQCR STUDY. NOVEMBER 1969 - JANUARY 1970
POLLUTANT: SO_2 UNITS: ppm

STATION	NUMBER OF READINGS	MAXIMUM	MINIMUM	ARITHMETIC MEAN	ARITHMETIC STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STANDARD DEVIATION
39	(1) 6	.018	.002	.008	.008	.005	2.78
	(2) 513	.290	.000	.020	.027	.014	2.44
70	(1) 30	.130	.005	.028	.027	.020	2.37
75	(1) 22	.045	.010	.027	.011	.024	1.58
	(3) 1659	.150	.000	.023	.019	.018	2.08
77	(3) 1906	.350	.000	.033	.037	.023	2.29
82	(1) 29	.040	.005	.016	.011	.013	1.93
83	(3) 1144	.150	.000	.022	.026	.151	2.59
105	(1) 6	.025	.010	.016	.006	.015	1.44
106	(1) 6	.020	.005	.012	.005	.011	1.60
	(2) 2079	.250	.000	.031	.028	.023	2.18
109	(1) 5	.015	.005	.008	.004	.007	1.67
110	(1) 27	.075	.000	.027	.025	.017	3.14
114	(1) 25	.055	.005	.018	.012	.014	1.95
203	(1) 28	.040	.005	.021	.009	.018	1.73
245	(3) 1171	.140	.000	.029	.024	.022	2.28

(NOTE)
(1) Wet Impinger, West-Gaeke & Pate Technique
(2) Colorimetric, Continuous Analyzer
(3) Coulometric, Continuous Analyzer

Table 1-9 MCIAQCR SULFATION DATA Nov. 1969-Jan. 1970

Station	County	Coordinates	$\mu g\ SO_2/cm^2/day$			
			Nov.	Dec.	Jan.	X_*
1	Dearborn	25, 39	6	11	15	11
2	Dearborn	24, 37	3	6	10	6
3	Dearborn	23, 38	5	12	14	10
4	Dearborn	25, 38	6	10	14	10
5	Dearborn	26, 39	7	6	15	9
6	Hamilton	28, 41	6	12	15	11
7	Hamilton	29, 42	9	10	14	11
8	Hamilton	31, 42	10	13	21	15
9	Hamilton	32, 43	22	15	21	19
10	Hamilton	28, 46	4	8	14	9
11	Dearborn	27, 44	4	6	14	8
11A	Dearborn	26, 42	8	6	17	10
12	Dearborn	24, 40	11	9		
13	Dearborn	24, 41	5	6	11	7
14	Dearborn	24, 42	4	8		
15	Dearborn	24, 39	6	10	18	11
16	Dearborn	22, 42	6	11	14	10
17	Dearborn	22, 41	6	11	15	11
17A	Dearborn	21, 36	2	6	11	6
18	Dearborn	21, 34	5	10	16	10
19	Boone	24, 36	4	6	14	8
20	Boone	28, 39	8	15	19	14
21	Boone	30, 37	3	6	11	7
22	Boone	29, 40	6	9	17	11
23	Boone	28, 36	7	12	18	12
24	Boone	26, 37	7			
25	Boone	22, 34	5	12	13	10
26	Boone	42, 35	6	14	18	13
27	Boone	42, 38	2	6		
28	Boone	39, 40	5	7	19	10
29	Boone	35, 44	6	11	16	11
30	Boone	33, 43	10	11	17	13
31	Boone	31, 41	10	11	19	13
32	Boone	35, 37	6	10	17	11
33	Boone	30, 32	4	6	11	7
34	Clermont	72, 32	4	4	11	6
35	Clermont	73, 31	6	3	10	6
36	Clermont	76, 31	11	2	15	9
37	Clermont	76, 30	3	3	15	7
38	Clermont	74, 31	3	2	14	6
39	Clermont	74, 29	6	5	17	9
40	Clermont	75, 26	7	4	11	7
41	Clermont	75, 25	2	6	10	6
42	Clermont	74, 27	4	2	11	6
43	Clermont	75, 29	10	9	16	12
44	Clermont	75, 30	10	8	17	12
45	Clermont	76, 28	9	12	14	12
46	Clermont	78, 27	6	11	14	10
47	Clermont	81, 29	4	4	13	7
48	Clermont	79, 34	9	6	16	10
49	Clermont	74, 37	6	5	14	8
50	Hamilton	65, 40	3	3	10	5

* arithmetic mean

Station	County	Coordinates	$\mu g\ SO_2/cm^2/day$ Nov.	Dec.	Jan.	$\bar{X}$
51	Hamilton	65, 38	3	3	7	4
52	Hamilton	68, 37	5	5	8	6
53	Hamilton	70, 36	6	3	13	7
54	Campbell	60, 36	4	10	10	8
55	Campbell	65, 33	5	10	10	8
56	Campbell	70, 32	4	8	6	6
57	Campbell	69, 30	4	9	7	7
58	Campbell	70, 31	5	13	14	11
59	Campbell	72, 29	2	7	8	6
59A	Campbell	72, 28	2	5	6	4
60	Campbell	70, 27	6	10	13	10
61	Campbell	72, 26	2	5	8	5
62	Campbell	73, 27	3	8	10	7
63	Campbell	73, 28	4	8	9	7
64	Campbell	72, 29	3	8	10	7
65	Campbell	79, 17	3	6	8	6
66	Campbell	77, 21	3	3	8	5
67	Campbell	75, 21	3	13	13	10
68	Campbell	73, 17	3	8	9	7
69	Campbell	70, 18	8	10	13	10
70	Campbell	66, 25	6	11	14	10
71	Campbell	69, 23	4	7	9	7
72	Campbell	72, 22	6	10	12	9
73	Campbell	75, 23	3	7	9	6
74	Hamilton	63, 43		7	10	[illegible]
76	Clermont	75, 34	7	3	22	11
77	Clermont	79, 32	6	6	14	9
80	Hamilton	60, 45	5			
81	Boone	38, 30	5	10	15	10
82	Boone	33, 35	7	14	17	13
83	Boone	27, 30	5	8	10	8
84	Boone	28, 26	5	7	12	8
85	Boone	28, 21	6	8	16	10
86	Boone	41, 25	6	10		
87	Kenton	50, 30	7	11	15	11
88	Hamilton	70, 39	6	5	18	10
90	Boone	38, 36	5	9	14	9
91	Boone	33, 41	11	14	24	16
92	Boone	37, 39	7	11	19	12
93	Boone	31, 40	13	12	13	13
93A	Boone	31, 38		10	18	
94	Boone	35, 33	6	13	19	13
94A	Boone	26, 36	5	7	12	8

Station	County	Coordinates	Nov.	Dec.	Jan.	$\bar{X}$
			$\mu g\ SO_2/cm^2/day$			
95	Boone	31, 29	6	-	15	
96	Boone	27, 33	5			
97	Boone	24, 35	4			
98	Boone	23, 34	3	7		
99	Boone	27, 32	5			
100	Boone	43, 29	6	10	15	10
101	Hamilton	32, 57	9	11	18	13
102	Hamilton	29, 57	5	7	10	7
103	Hamilton	30, 50	2	7	8	6
104	Hamilton	33, 49	9	13		
105	Hamilton	32, 48	6	6	14	9
106	Hamilton	34, 48	8	7	10	8
107	Hamilton	34, 47	9	9	11	10
108	Hamilton	33, 44	14	6		
109	Hamilton	30, 45	9	9	16	11
110	Dearborn	22, 37	3	8	12	8
111	Dearborn	20, 47	2	7	9	6
112	Dearborn	15, 51	3	7		
114	Dearborn	09, 60	5	5	18	9
115	Dearborn	19, 59	3	4	10	6
116	Hamilton	39, 59	-	9	13	
117	Butler	30, 70	8	7	14	10
118	Butler	31, 80	3	6	11	7
119	Butler	29, 89	5	10	16	10
120	Butler	39, 89	7	10	18	12
121	Butler	39, 79	9	10	19	13
122	Butler	39, 70	8	7	18	11
123	Butler	50, 68	6	9	12	9
124	Butler	59, 69	6	8	14	9
125	Butler	59, 80	9	10	14	11
126	Butler	51, 80	5	8	12	8
127	Butler	50, 90	6	10	22	13
128	Butler	60, 90	4	7	13	8
129	Warren	70, 89	6	4	14	8
130	Warren	79, 90	6	3	13	7
131	Warren	90, 90	6	10	14	10
132	Warren	89, 80	2	5	9	5
133	Warren	80, 81	8	10	15	11
134	Warren	70, 78	6	6	12	8
135	Warren	70, 70	10	10	14	11
136	Warren	79, 70	6	7	11	8
137	Warren	90, 70	5	6	13	8
140	Dearborn	25, 41	11	11	18	13
141	Dearborn	26, 40	8	7	15	10
142	Hamilton	65, 47	5	6	13	8
143	Hamilton	67, 50	6	9	14	10
144	Hamilton	59, 46	8	8	13	10
145	Hamilton	54, 43	10	13	16	13
146	Kenton	47, 31			12	

			$\mu g\ SO_2/cm^2/day$			
Station	County	Coordinates	Nov.	Dec.	Jan.	$\bar{X}$
151	Hamilton	58, 55		7	14	
152	Hamilton	34, 45			12	
153	Clermont	75, 24		7	11	
154	Campbell	56, 39				
155	Hamilton	61, 41			14	
159	Kenton	57, 37			12	
160	Hamilton	51, 41	5	10	14	10
161	Hamilton	52, 45	6	9	-	
162	Kenton	55, 39	19		16	
163	Hamilton	57, 49	19	9	16	15
164	Hamilton	51, 45		6		
201	Dearborn	20, 37	4	4	13	7
202	Dearborn	19, 40	2	5	14	7
203	Dearborn	18, 42	6	8	18	11
204	Dearborn	16, 43	4	10	15	10
205	Dearborn	12, 44	5	10	13	9
206	Dearborn	09, 47	6	14	17	12
207	Dearborn	07, 40	2	8	15	8
208	Dearborn	13, 37	6	14	14	11
209	Dearborn	17, 35	6	8	14	9
210	Dearborn	13, 40		6	9	
211	Dearborn	11, 41	3	6	15	8
212	Ohio	26, 23	4	5	13	7
213	Ohio	23, 30	4	9	13	9
214	Ohio	20, 26	2	3	10	5
215	Ohio	17, 23	6	5	13	8
216	Ohio	18, 18	6	10	14	10
217	Ohio	06, 18	6	7	14	9
218	Dearborn	04, 25	5	9	14	9
219	Dearborn	08, 30	3	8	11	7
220	Ohio	13, 26	6	6	11	8
221	Dearborn	15, 31	5	11	14	10
222	Dearborn	13, 34	2		8	
223	Dearborn	07, 36	5	11	17	11
224	Dearborn	07, 48	6	12	16	11
250	Hamilton	60, 50	4	2	12	6
251	Hamilton	60, 56	2	5	12	6
252	Hamilton	60, 61	2	2	14	6
253	Hamilton	50, 61	2	4	18	8
254	Hamilton	50, 57	2	4		
255	Hamilton	50, 51	3	3	14	7

Station	County	Coordinates	µg SO_2/cm^2/day Nov.	 Dec.	 Jan.	 $\bar{X}$
256	Hamilton	50, 45	5	3	14	
257	Hamilton	50, 40		-	12	
258	Hamilton	40, 41		5	12	
259	Hamilton	40, 46		7	14	
260	Hamilton	40, 51		2	11	
270	Hamilton	64, 51		11	17	
271	Hamilton	54, 48		7		
272	Hamilton	55, 45		5	14	
273	Hamilton	57, 44		6	22	
274	Hamilton	62, 47		12	15	
275	Hamilton	45, 46		5	10	
276	Hamilton	60, 53				
277	Hamilton	53, 51				
278	Hamilton	47, 42		10		
279	Hamilton	44, 39				
300	Clermont	73, 35	9	1	14	8
301	Hamilton	63, 35	4	4	12	7
302	Hamilton	71, 33	5	2	11	6
303	Clermont	76, 26	3	2	10	5
304	Clermont	77, 25	6	4	17	9
305	Clermont	80, 26	5	4	14	8
306	Clermont	80, 39	6	2	14	7
307	Clermont	90, 40	5	10	14	10
308	Clermont	89, 29	2	5	12	6
309	Clermont	73, 41	6	6	15	9
310	Clermont	77, 38	3	2	14	6
311	Clermont	80, 36	7	5	15	9
312	Clermont	77, 35	6	2	15	8
313	Clermont	77, 33	8	2	17	9
314	Clermont	77, 31	4	2	10	5
315	Clermont	78, 28	8	2	18	9
316	Clermont	77, 27	5	9	10	8
317	Clermont	78, 26	2	2	9	4
318	Clermont	82, 25	5	2	15	7
319	Clermont	79, 23	10	4	14	9
320	Clermont	75, 33	11	2	18	10

			µg $SO_2/cm^2/day$			
Station	County	Coordinates	Nov.	Dec.	Jan.	$\overline{X}$
321	Hamilton	70, 50	6	4	15	8
322	Clermont	80, 49	3	8	15	9
323	Clermont	90, 49	2	10	14	9
324	Hamilton	67, 45	5	3	9	6
326	Boone	25, 32	15	6	11	11
327	Boone	38, 20	18			
328	Boone	39, 10	16	6	15	12
329	Campbell	60, 39	6	8	13	9
330	Clermont	89, 20	2	4	13	6
331	Campbell	61, 30	9	10	14	11
340	Clermont	99, 09		5	13	
341	Clermont	84, 14		6	9	
342	Clermont	79, 19		4	9	
343	Clermont	90, 59				
344	Clermont	80, 59		5	9	
345	Hamilton	69, 59		6	12	
346	Hamilton	64, 45		10	17	
347	Hamilton	64, 54		9	20	
348	Hamilton	61, 54		9		
349	Hamilton	54, 54		8	15	
350	Hamilton	57, 52		7	15	
351	Hamilton	55, 41		6		
352	Hamilton	53, 40		10	15	
353	Hamilton	54, 42		9	15	
400	Campbell	66, 13		6	10	
401	Kenton	51, 21		4	8	
402	Kenton	61, 20		7	14	
403	Kenton	53, 10		8	12	
500	Hamilton	44, 55			18	
501	Hamilton	58, 47			13	
502	Hamilton	54, 46			17	
503	Hamilton	56, 43			16	
504	Hamilton	60, 42			10	
505	Hamilton	62, 40			12	

Station	County	Coordinates	μg $SO_2/cm^2/day$		
			Nov.	Dec.	Jan.
506	Hamilton	66, 42			15
507	Hamilton	55, 48			15
508	Campbell	58, 42			10
509	Hamilton	60, 49			
510	Hamilton	63, 39			9
511	Hamilton	51, 54			14
512	Hamilton	46, 58			16
513	Hamilton	54, 59			14
514	Hamilton	59, 59			15
515	Hamilton	65, 58			18
516	Clermont	75, 47			9
517	Hamilton	69, 47			18
518	Hamilton	43, 49			11
519	Hamilton	43, 43			14
520	Hamilton	46, 52			10
521	Clermont	73, 48			11
522	Hamilton	70, 43			10
523	Hamilton	75, 44			10

Table 1-10. AIR QUALITY STANDARDS FOR MCIAQCR
(concentrations in micrograms per cubic meter)

	SULFUR OXIDES				PARTICULATES		
State	Annual	Monthly	24 Hours	1 Hour	Annual	24 Hours 1 Percent[3]	Maximum
Indiana	43(AM)[1]		286	1201	75(GM)	200	200
Kentucky	57(GM)[2]	143	286	858	65(GM)	180	220
Ohio	43(AM)		286	858	65(GM)	200	260

[1] AM - Arithmetic Mean

[2] GM - Geometric Mean

[3] Concentration not to be exceeded more than 1 percent of the time

1.6.4 Air Quality Standards

The Air Quality Standards adopted by the States are shown in Table 1-10. These are the goals which the implementation planning process must be designed to achieve. Although the Standards vary somewhat from state to state within the Region, these discrepancies are not significant enough to prevent effective regionwide planning for air pollution control. Indeed, considering the transport of pollution from one section of the Region to another, there appears to be no reason why control strategy development cannot proceed on a regional basis leading to the eventual adoption of uniform emission control regulations throughout the Region.

1.7 SAMPLING RECORDS IN NORTHERN KENTUCKY

1.7.1 Station Locations

Figure 1-9 shows the locations of past and present stations within the Northern Kentucky three-county section of the MCIAQCR at which air quality sampling has been conducted. The first station, identified as No. 105, was put into operation in 1964 at Seventh and Scott Streets in Covington, as part of the National Air Sampling Network (NASN) program. Data collected at this station on alternate years consist of bi-weekly 24-hour high-volume (Hi-vol) and SO_2 samples, the latter analyzed by means of the West-Gaeke technique.

The Kentucky Air Pollution Control Commission conducted a one-year study of air quality in the area of Covington and environs, compelted in April 1969. It utilized a network of one mobile station (No. 39) and seven fixed sites (Station Nos. 40 to 46) for hi-vol sampling. In addition, 24-hour SO_2 bubbler sampling was done at four of the sites, including the mobile station. In November 1969, Station Nos. 39 and 42 were reactivated and three additional stations established for hi-vol sampling. The special air monitoring network operating through January 1970, with the ocomplement of equipment is shown in Table 1-11.

Several rural stations have also been in temporary operation for special surveys in the three-county area.

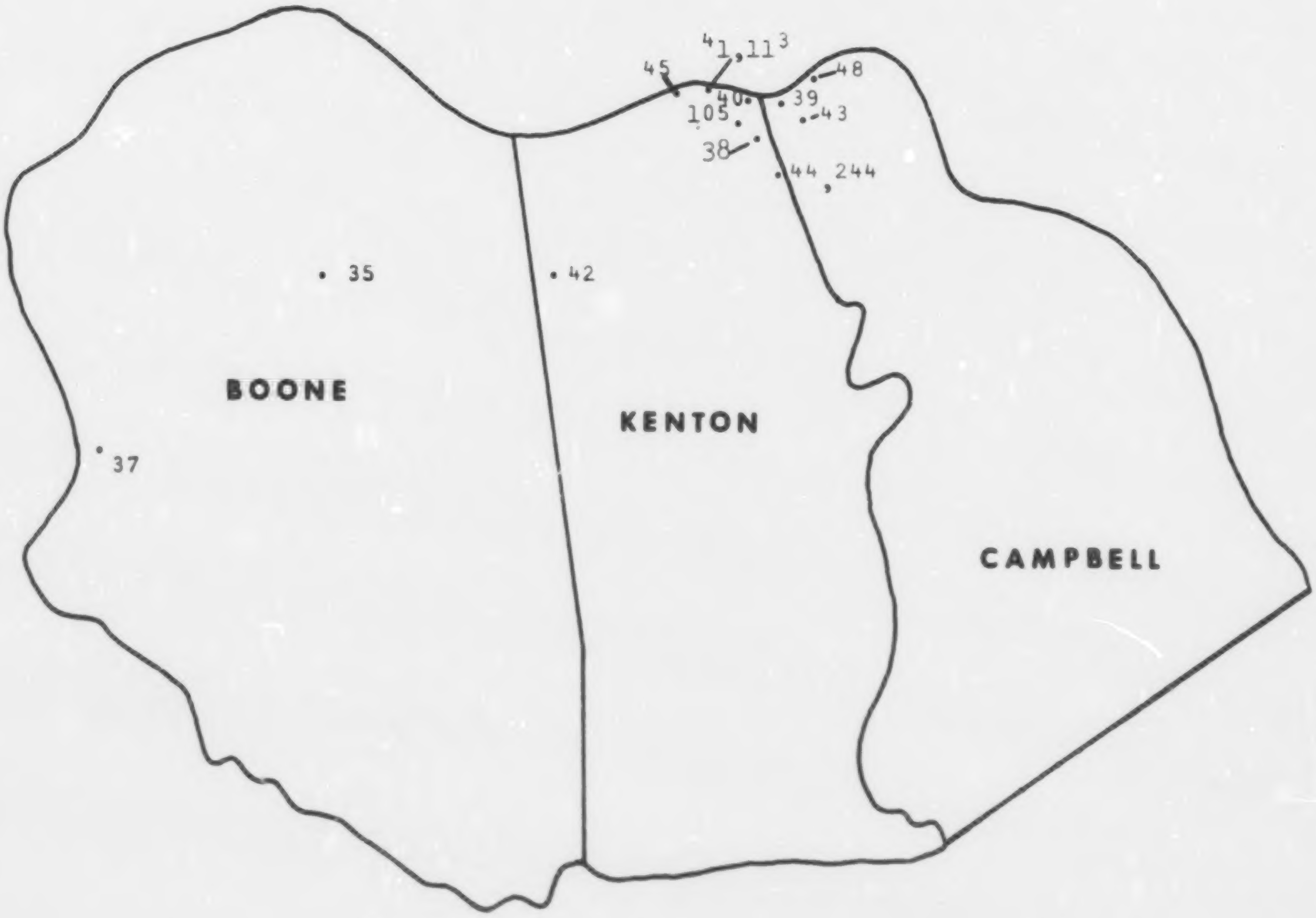


Figure 1-9. AIR QUALITY STATIONS IN NORTHERN KENTUCKY, PAST AND PRESENT

Table 1-11. SPECIAL AIR MONITORING NETWORK - KENTUCKY
(November 1969 - January 1970)

	POLLUTANT						
	Particulates		Sulfur Dioxide				
Station	Hi-Vol	Dustfall	24-Hr. Bubbler	Waco	906	CAMP	Sulfation
244	X						
39	X	X	X	X	X	X	X
42	X						
105	X		X				
113	X						

1.7.2 Air Quality Data

1.7.2.1 Particulates

The longest record of particulate concentrations in Northern Kentucky is that for Station No. 105, in Covington, which shows three full calendar years of data since the station was established in 1964. A comparison of annual mean concentrations for the three years, shown in Table 1-12 suggests a slight downward trend. Since the bi-weekly observational schedule provided only 26 measurements per year, the confidence level ascribable to the apparent trend cannot be very high. Much further reduction in ambient concentrations will be required if they are to be brought down to an annual geometric mean of 65 $\mu g/m^3$, which is the standard set by the State of Kentucky. As shown in Table 1-12 the sampling measurements at four sites thus far have not met the statewide standard for maximum 24-hour concentrations of 220 $\mu g/m^3$.

1.7.2.2 Sulfur Dioxide

Sulfur dioxide data for Northern Kentucky are sparse, but more will become available if operations at the mobile station (No. 39) and others continue. Measurements taken during the program that ended in April 1969 have been analyzed, and a cumulative frequency distribution of measurement data is given in Table 1-13. The data given for Station No. 39 are from 24-hour SO_2 bubbler sampling, not for the continuous SO_2 analyzer that is also in operation. Based on the statewide standard of 57 $\mu g/m^3$ for the annual geometric mean, sulfur dioxide pollution has not been a pressing problem in Northern Kentucky.

Station Number	Operating Period	CONCENTRATION - µg/m³								
		Percent Time ≤ Stated Value					Maximum	Geometric		Arithmetic Mean
		10	30	50	70	90		Mean	Standard Deviation	
39	4/68-4/69	58	82	100	130	185	350	100	1.60	112
40	7/68-4/69	47	67	86	115	195	265	86	1.98	107
41	7/68-4/69	45	60	75	100	155	222	75	1.80	89
42	7/68-4/69	37	48	67	92	117	571	67	1.63	76
44	7/68-4/69	23	43	63	84	108	156	63	1.59	70
45	7/68-4/69	36	50	66	88	122	167	66	1.67	75
46	8/68-4/69	44	57	74	102	145	198	74	1.78	87
43	8/68-4/69	78	88	100	120	173	218	100	1.73	116
105 (NASN)	1964	56	90	115	143	207	281	111	1.52	121
105 (NASN)	1966	65	85	104	127	164	231	105	1.44	112
105 (NASN)	1969	56	75	93	119	140	176	93	1.43	100

Table 1-12. SUMMARY OF SUSPENDED PARTICULATE MEASUREMENTS AT SITES WITHIN THE MCIAQCR

Table 1-13. SUMMARY OF SULFUR DIOXIDE MEASUREMENTS AT SITES WITHIN KENTUCKY
(concentrations in micrograms per cubic meter)

									Geometric		
Site	Period	Minimum	10	30	50	70	90	Maximum	Mean	Standard Deviation	Arithmetic Mean
39[a]	Apr.68-Apr.69	<14	<14	14	23	40	80	349	23	2.75	38
44	Jul.68-Apr.69	<14	<14	<14	17	34	69	80	17	3.17	33
45	Jul.68-Apr.69	<14	<14	14	31	57	113	89	31	2.82	53
46	Aug.68-Apr.69	<14	<14	20	34	57	106	134	34	2.40	50

[a] 24-Hour Averaging Time

2.0 CONTROL PLAN

An Emission Control Strategy is made up of a set of compatible emission standards. Each standard applies to emissions from a specific type of operation (e.g., fuel combustion, industrial process, solid waste disposal), and the summation of the several standards included within each strategy defines allowable emission levels from each source in the region. In an air quality control region made up of several political jurisdictions (states, counties, or cities), each set may apply to a specific political jurisdiction within the region. Separate emission control strategies are defined for each pollutant.

2.1 DESCRIPTION OF THE SIMULATION MODEL

The simulation model used for strategy evaluation was the Implementation Planning Program developed by TRW Systems Group under contract with the National Air Pollution Control Administration, U. S. Department of Health, Education and Welfare. This program uses three computer models to perform an analytic evaluation of each proposed control strategy.

2.1.1 Atmospheric Diffusion Model

This model, operating on a data base [illegible]sting of a regional source emission inventory and annual average meteorological data, produces expected ground level pollutant concentrations on an annual arithmetic average basis. Expected ground level concentrations are calculated at a large number (200-250) of receptor sites throughout the region. Isopleth maps and other visual displays of projected air quality are produced to aid in regional evaluations. Existing air quality measurements are used to verify the predicted concentration values so that further extrapolations and projections can be made with some assurance (see Section 2.3). The atmospheric diffusion model provides the key link between pollutant emissions and ambient air quality necessary to make informed decisions relating to proposed emission regulations. The diffusion model, by providing a set of factors relating each emission source to receptor points throughout the air quality control region, allows the effect of various degrees of emission reduction to be examined in terms of expected ambient pollutant concentrations.

2.1.2 Control Cost Model

A complete evaluation of an air pollution control strategy should include consideration of the various control techniques and measures which would be required by the emission reduction plan. This can be accomplished by an examination of all the control alternatives available to each source within the region. This examination should include not only the control efficiencies expected from the various control measures but also an estimate of the cost of each measure. Only with such information developed on the basis of available control technology can a judgment be made concerning the feasibility and cost of various emission reduction plans. The Control Cost Model prepares a listing of applicable control techniques for each pollution source identified in the regional emission inventory. This listing defines the types of available devices or control measures and estimates the control efficiency and cost of each. The data generated by this model is utilized in the subsequent control strategy evaluation section of the program.

2.1.3 Control Strategies Model

This model operates upon information produced by the two computer models described above to provide summary compilations relating to the regional effects of various control strategies. Control strategies consist of a set of compatible emission standards covering all political jurisdictions and source types included in the air quality control region. Emission standards, the basic building blocks of control strategy, generally specify maximum emission levels of a particular pollutant for certain source types. A combination of emission standards covering all the sources of a pollutant is thus an emission control strategy. By applying the emission reductions which would be required under each strategy to the atmospheric diffusion model described above, it is possible to estimate the ambient air quality levels which would result. Also, the overall cost to the region of bringing each source into compliance with the various emission standards is estimated. The degree to which current control technology is able to supply the required emission reductions is available for review. The Control Strategies Model is capable of simulating a variety of control alternatives available to regional control officials and provides them information with which to judge the relative merits of each. Regional growth predictions and other factors can also be analyzed with the model.

The overall computer simulation program thus provides the user with the type of data on which an informed judgment concerning air quality control regulations may be based.

2.2 RATIONALE FOR SELECTION OF OPTIMAL STRATEGY

Several criteria are available with which to measure the desirability of any control strategy. The use of the computer simulation modeling technique aids control strategy selection by providing detailed technical estimates of the regional effects of various alternative strategies. The following is a list of the criteria used in selecting the optimum control strategy in this Implementation Plan, together with a brief description of how these criteria are compiled.

2.2.1 Compatibility with Air Quality Standards

Air quality standards for particulate and sulfur dioxide pollutants have been adopted by the three states making up the MCIAQCR. The primary purpose of emission control regulations is to bring ambient pollutant levels into compliance. By simulation modeling of the emission reductions required, a control strategy can be evaluated with atmospheric diffusion calculations. The process leads to rejection of those strategies under which emission levels remain too high to allow achievement of the desired air quality.

2.2.2 Regional Cost

After one or more strategies have been found which will permit attainment of air quality standards, the total cost of implementing these emission standards must be considered. As was mentioned in Section 2.1, the simulation model being used provides an estimate of cost based on available control technologies. If two control strategies promise nearly equal ambient air quality, then the less costly of the two would be the most desirable. In addition to the overall cost of implementing a particular control strategy, some source categories may experience greatly different control requirements under different strategies. The computer simulation output enables examination of this phenomenon with respect to important source categories.

2.2.3 Enforceability

Certain types of emission standards may be easier for a control agency to administer and enforce than others; even though equivalent pollutant reductions are required. Field experience gained in actual control agency operations is invaluable in making an evaluation of this factor. The control agency resource requirements may well be influenced by the type of emission standards ultimately adopted.

2.2.4 Summary

Each of the alternate strategies was evaluated according to the above criteria and the optimum set of emission standards was selected. These emission standards were used in formatting the proposed control regulations (Section 4.2).

2.3 MODEL VERIFICATION

The use of measured ambient pollutant data is an essential step in the simulation process. The model verification or validation compares model estimates of pollutant concentration with actual measured values. Several potential errors in the atmospheric transport and diffusion calculations may be examined and systematically accounted for by this procedure.

a) The pollutant emission inventory can be examined for consistency with air quality measurements. Errors or omissions in the inventory are often detected at this stage and may be corrected before continuing with the strategy simulation exercise.

b) Topographic conditions peculiar to the air quality region may be evaluated. While the diffusion model does not explicitly consider terrain features, their effect on air quality may be accounted for by the verification process.

The basic results generated by the model verification are a statistical regression line relating measured to calculated ground level concentrations and a correlation coefficient. Based on the correlation coefficient and the number of measurement stations, it is possible to make a statistical estimate regarding the validity of the model predictions compared with actual air quality measurement. A high correlation coefficient (close to unity) indicates that the diffusion model results correctly indicate the trend in pollutant concentrations as measured in the region.

The regression line relating predicted to measured pollutant concentrations is used to correct the model estimates. The two parameters of the linear regression each have a particular meaning and interpretation in the diffusion model verification.

y-Intercept - The regression line may be visualized by plotting measured versus calculated concentrations on the x and y axis, respectively, of a scatter plot diagram (See figures 2-2 and 2-5). The y intercept, y_o, is the minimum value that may be predicted using the regression line to relate calculated to measured concentrations. In this sense, y_o may be considered a background concentration.

Slope - The slope of the regression line indicates the amount of increase observed in the measured concentrations (or in the concentration predicted using the regression line) due to a given increase in that calculated by the diffusion model.

The air quality data available for model verification in the MCIAQCR consisted of the results of measurements made throughout the region during the months of November and December 1969, and January 1970. The use of seasonal air quality data as a basis for verifying a model designed basically to predict average annual concentration values is open to question. Indeed the results described in this section show that for the MCIAQCR it was not possible to develop a useful model verification from the winter period for sulfur dioxide.

In addition to the air quality data, several other types of information were used during the model verification exercise. Meteorological data used were the average winter mixing height as measured at the Dayton (Ohio) Airport, and the wind direction and speed data for the three month period collected at the Cincinnati Airport located in Covington, Kentucky. The same sources of meteorlogical data were used in making the annual concentration estimates based on the atmospheric diffusion model. In this case, however, averages taken over five years were used rather than a specific annual period. (See Appendix A for meteorological data.)

No specific effort was made to account for the topographic features of the region in the model verification procedure.

2.3.1 Suspended Particulates

Diffusion model verification for suspended particulates used air quality measurements made by the 24 hour high volume filter technique. The location of these stations is displayed in Figure 2-1. These stations adequately cover the geographical area of the MCIAQCR. A number of model verification runs were made based on the data collected from these stations. During the initial runs, a number of errors in both the original emission inventory and in the air quality data were detected. The errors were corrected and a final verification run was made.

Figure 2-2 displays the results of this computation. This figure shows the measured air quality data plotted against the model calculations for the same location based on the emission inventory and meteorological data. The line shown is the regression line calculated on the basis of the data. The regression is highly significant in a statictical sense (less than a 1% probability that no correlation exists). The background, y_0, value of 36 $\mu g/m^3$ is also regarded as acceptable, i.e., it represents a reasonable approximation of background levels of suspended particulates, or the irreducible level due to uncontrollable sources.

The results of using the regression line resulting from this verification to project average annual concentrations are shown in Figure 2-3. Available average annual measured concentrations (also shown) correlated well with the model estimates. Figure 2-3 indicates that the use of seasonal data (winter) for air quality measurements, meteorological and emission data appeared fairly effective in the case of particulates.

Measurements of ambient concentrations of suspended particulate pollutants have been made at various locations in the MCIAQCR since 1957. For the most part, the sampling sites were located in or near the City of Cincinnati and were operated for periods of one year or less. As a result, there is a paucity of data for the Region as a whole. There are four locations (three in Cincinnati and one in Covington) where data are available for the year 1969. These four stations include three which are a part of the National Air Sampling Network and the CAMP station. The annual (1969) geometric mean concentrations at these stations are shown on a map of the Region (Figure 2-3). Included on the map are the geometric mean concentrations for the stations in the Northern Kentucky Air Monitoring Network (July 1968 to April 1969) and the Cincinnati

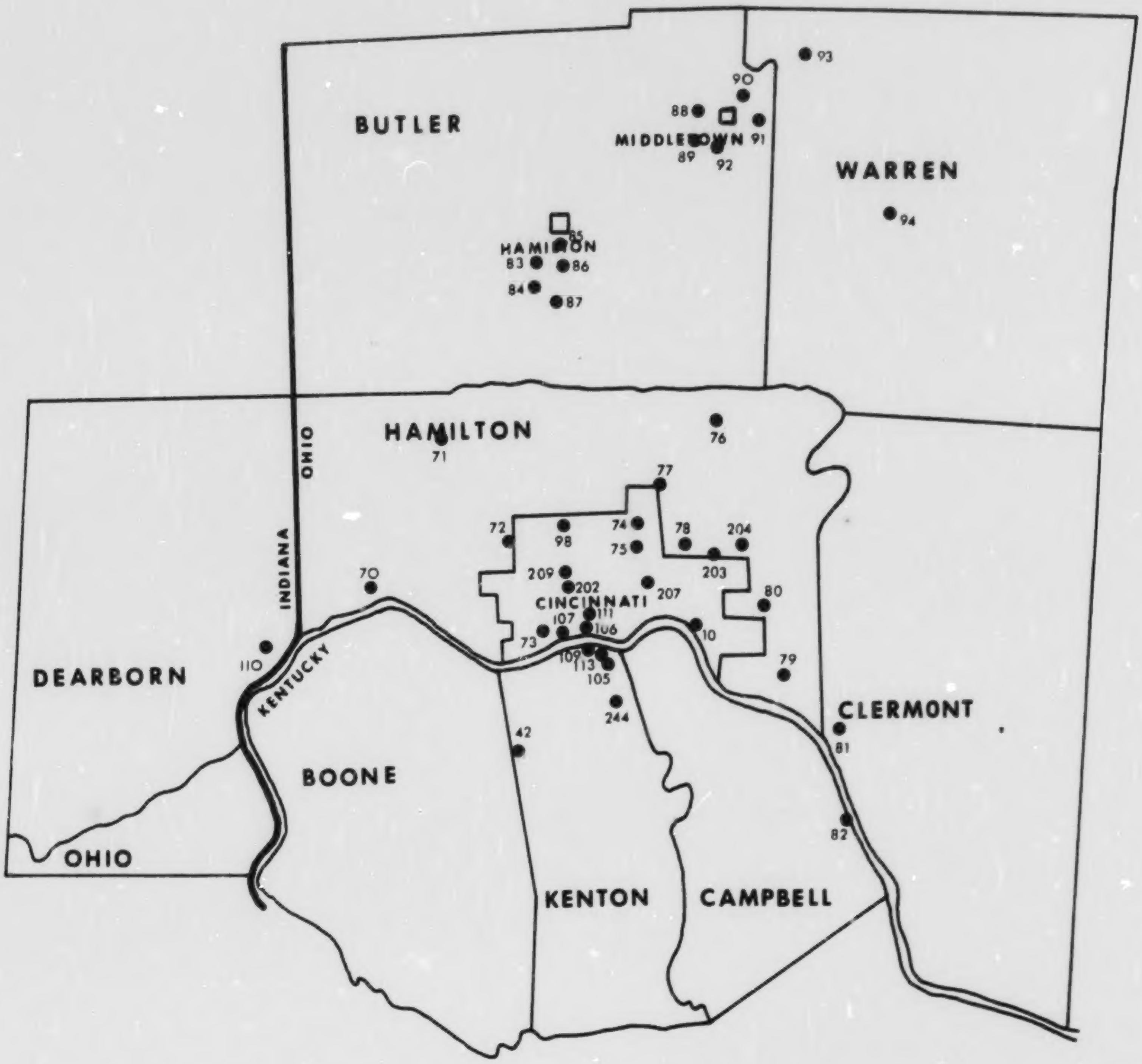


Figure 2-1. Particulate Measuring Stations
Used in Model Verification

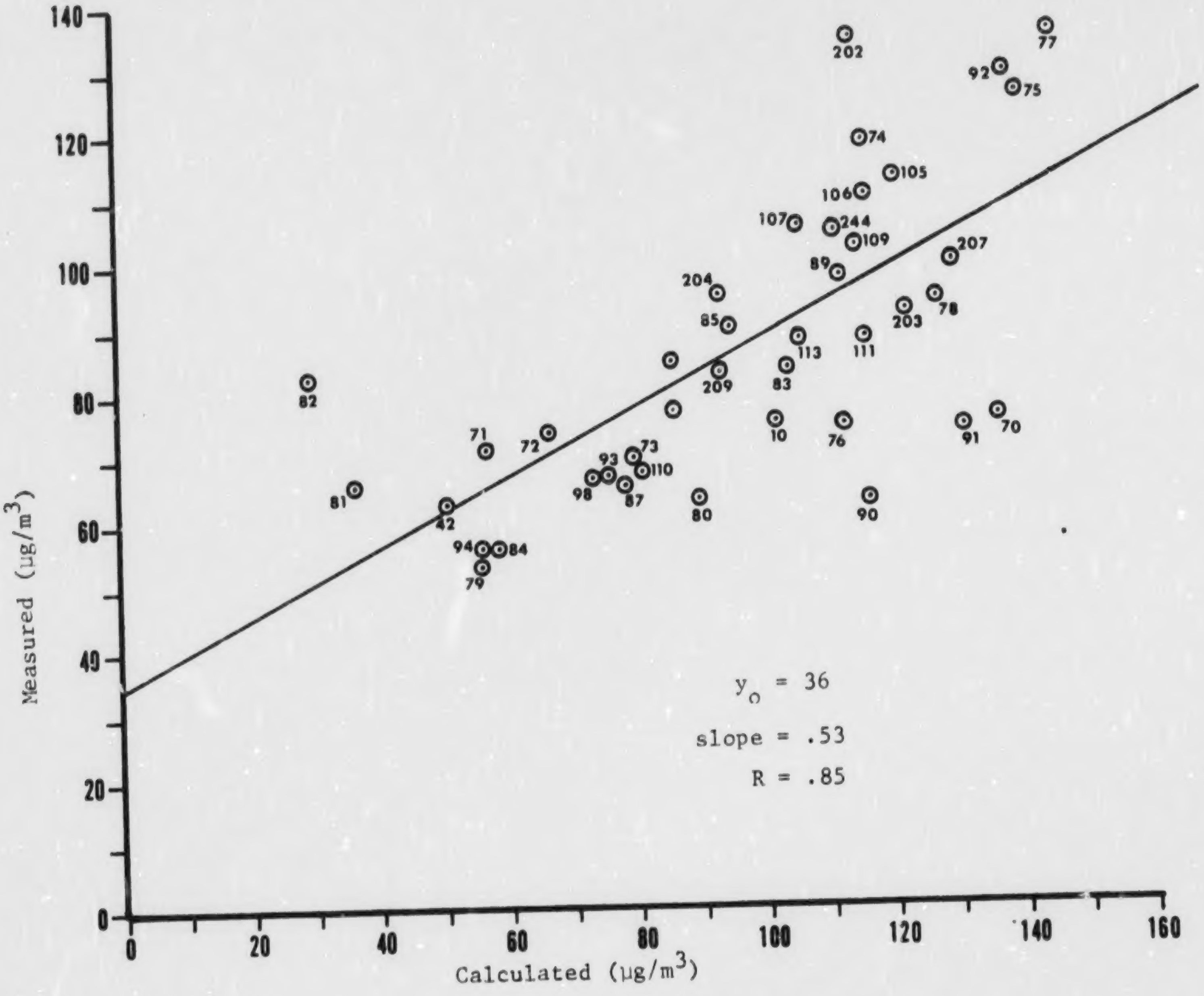


Figure 2-2. Particulate Diffusion Model Verification
(Winter Data - November 1969 - January 1970)

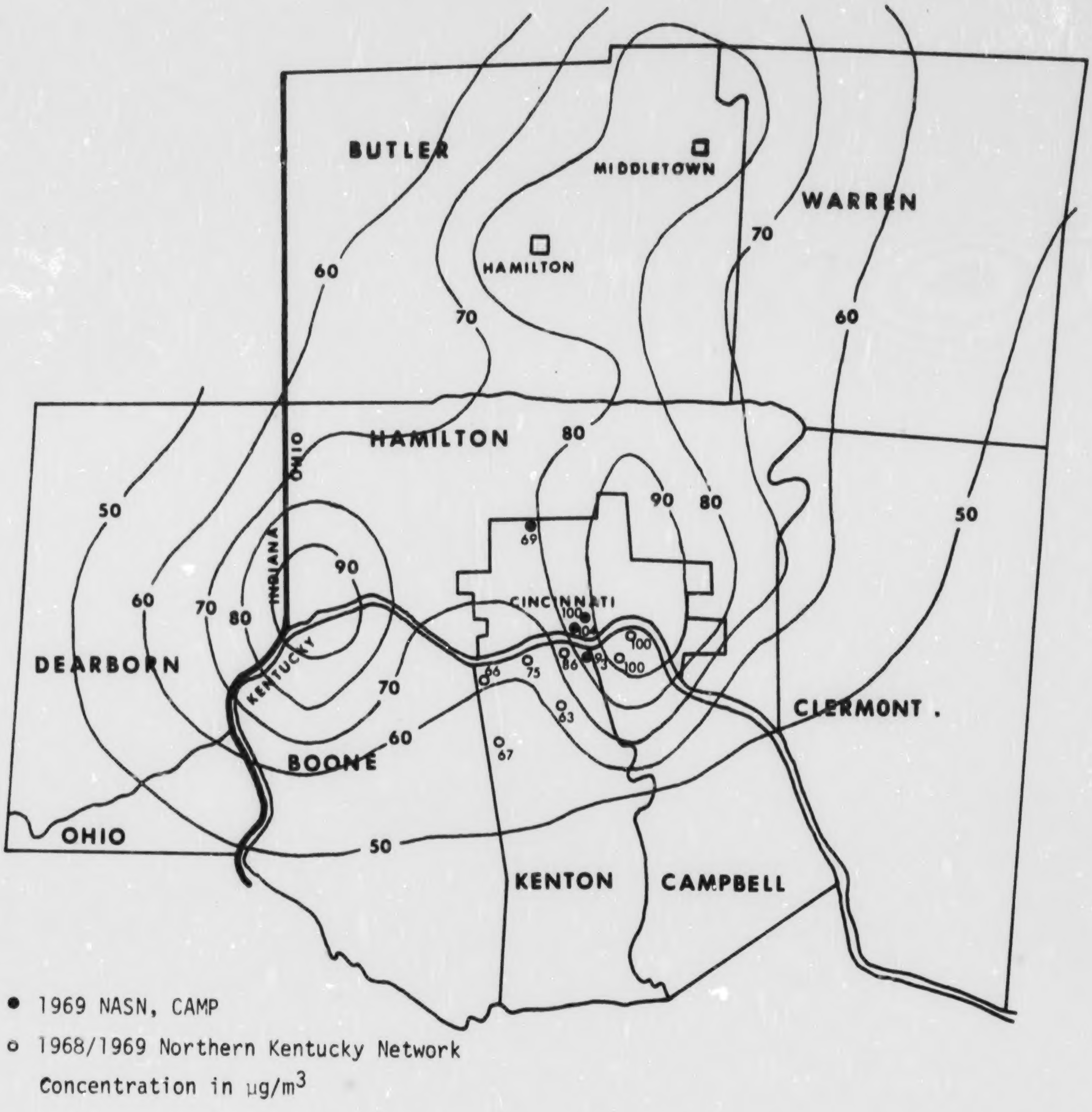


Figure 2-3. ANNUAL GEOMETRIC MEAN CONCENTRATIONS OF SUSPENDED PARTICULATE POLLUTANTS AS MEASURED AT SELECTED SAMPLING STATIONS AND ANNUAL ARITHMETIC MEAN CONCENTRATIONS AS ESTIMATED BY DIFFUSION MODFL

School Study (October 1967 to May 1968).

In order to illustrate the geographical distribution of particulate pollutants for the entire MCIAQCR, the measurement data must be supplemented by estimates of concentration from the diffusion model. The isopleths shown on Figure 2-3 represent annual arithmetic mean concentrations as determined by the model using the 1969 emission inventory and climatological data for the period 1965-1969. (See Section 2.1 for discussion of model.)

There is an inconsistency in Figure 2-3 in that the measurement data are presented as geometric means and the diffusion model estimates are presented as arithmetic means. This inconsistency stems from the fact that the annual air quality standards are expressed in terms of geometric means (65 $\mu g/m^3$ for Kentucky and Ohio, 75 $\mu g/m^3$ for Indiana) and the Martin-Tikvart diffusion model provides only annual arithmetic mean concentrations. For comparative purposes, the arithmetic means can be reduced by 10-15 percent to obtain geometric means.

From Figure 2-3 it is apparent that there are large areas within the MCIAQCR where the air quality standards for particulate pollutants are being exceeded. Areas of high pollution are centered on Cincinnati and Newport, Kentucky, the City of Hamilton and the vicinity of the Ohio and Indiana border near the Ohio River.

This verified diffusion model was used to test various alternative control strategies (Section 2.4).

2.3.2 Sulfur Oxides

Considerably more difficulty was experienced in obtaining a satisfactory model verification for sulfur oxides. Problems relating to data incompatibility with the diffusion model caused the simulation technique to be abandoned for this pollutant.

Initial air quality data were available from fourteen measurement sites for the three month winter period (November 1969 through January 1970). Three measurement techniques were used; West-Gaeke analysis employing liquid impinger samplers, continuous conductimetric measurements, and continuous colorimetric measurements. A satisfactory relationship could not be developed between the different sampling and analytic techniques used and it was necessary to restrict the model validation exercise to a single measurement type. At one station, number 106, both West-Gaeke and continuous colorimetric measurements were made during the three month study period. The results show that colorimetric measurements gave average readings 50$\mu g/m^3$ higher than the West-Gaeke technique during the three month period. Since the West-Gaeke method is widely regarded as the standard method only these measurements were used in the model verification procedures.

Other sampling stations were not used because insufficient samples were taken to provide a representative average of the sampling period. The result of these restrictions was to reduce the number of air quality measuring sites available for verification to seven and to reduce the geographical coverage of the region.

Figure 2-4 shows the locations and identification numbers of the sampling stations used in the model validation. The relationship between measured and calculated sulfur dioxide concentrations at these sites is shown in Figure 2-5. The regression line and its coefficients are also displayed in this figure. This represents the best model verification which could be obtained for the winter season based on the air quality data and emission inventory available.

It was recognized that any acceptable verification of the model must be applicable to annual as well as winter conditions before the simulation of control strategies could be accomplished. An attempt was made to use annual average sulfation plate data to verify the diffusion model. This was unsuccessful because the sulfation data did not record a wide enough range of air quality to yield a regression line slope that was significant in either a statistical or practical sense.

Annual average pollutant concentrations were calculated for the MCIAQCR based on the model verification presented in Figure 2-5. These concentrations are presented in Figure 2-6.

The ambient air monitoring data for sulfur dioxide are more scarce, both on a regiowide basis and locally, than was the case for particulates. Presentation of regional air quality must necessarily depend on measurements gathered at relatively few stations. Some localized and short-term measurements specific to this state are presented in Section 1.

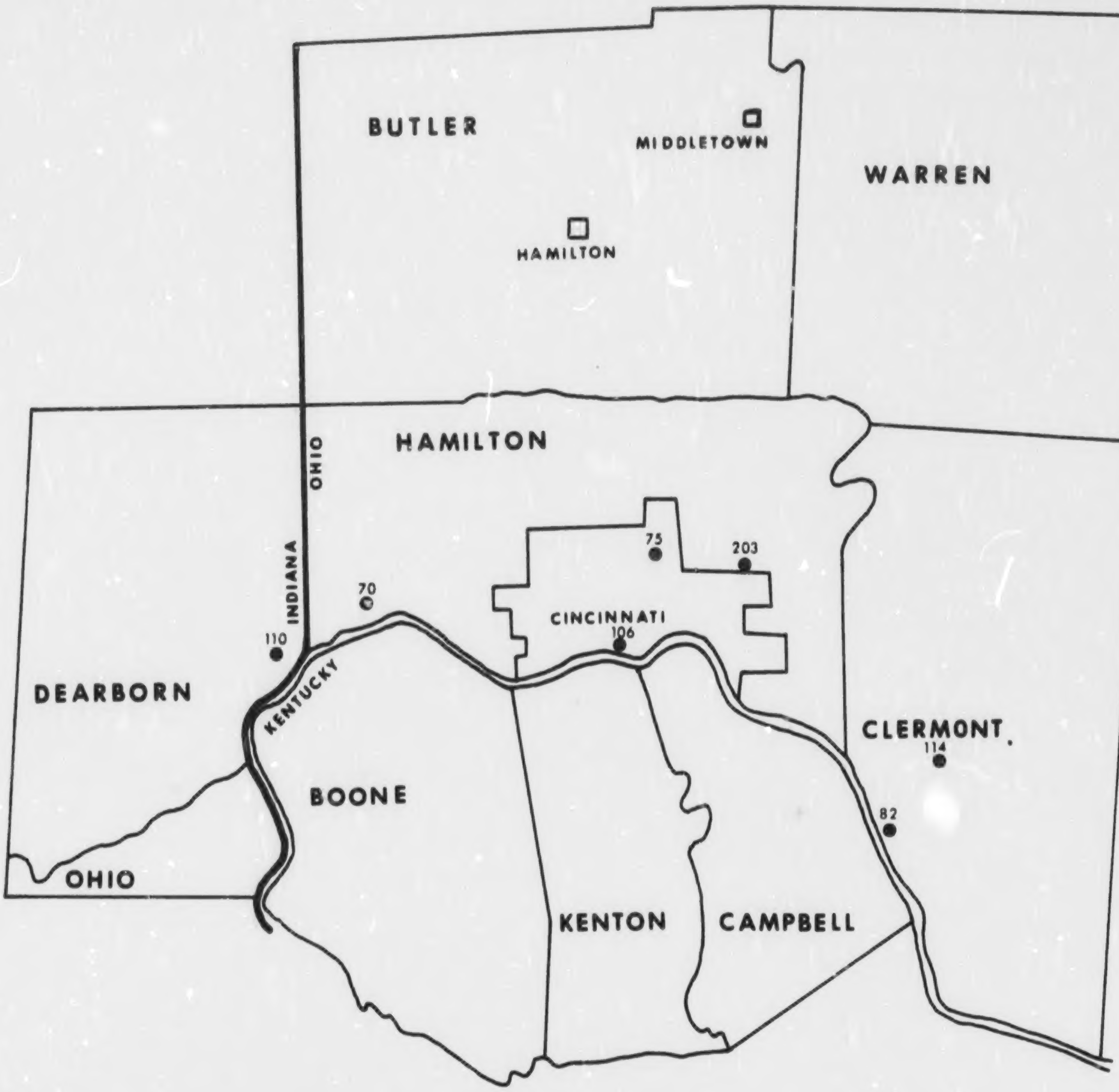


Figure 2-4. SULFUR OXIDE MEASURING STATIONS USED IN MODEL VERIFICATION

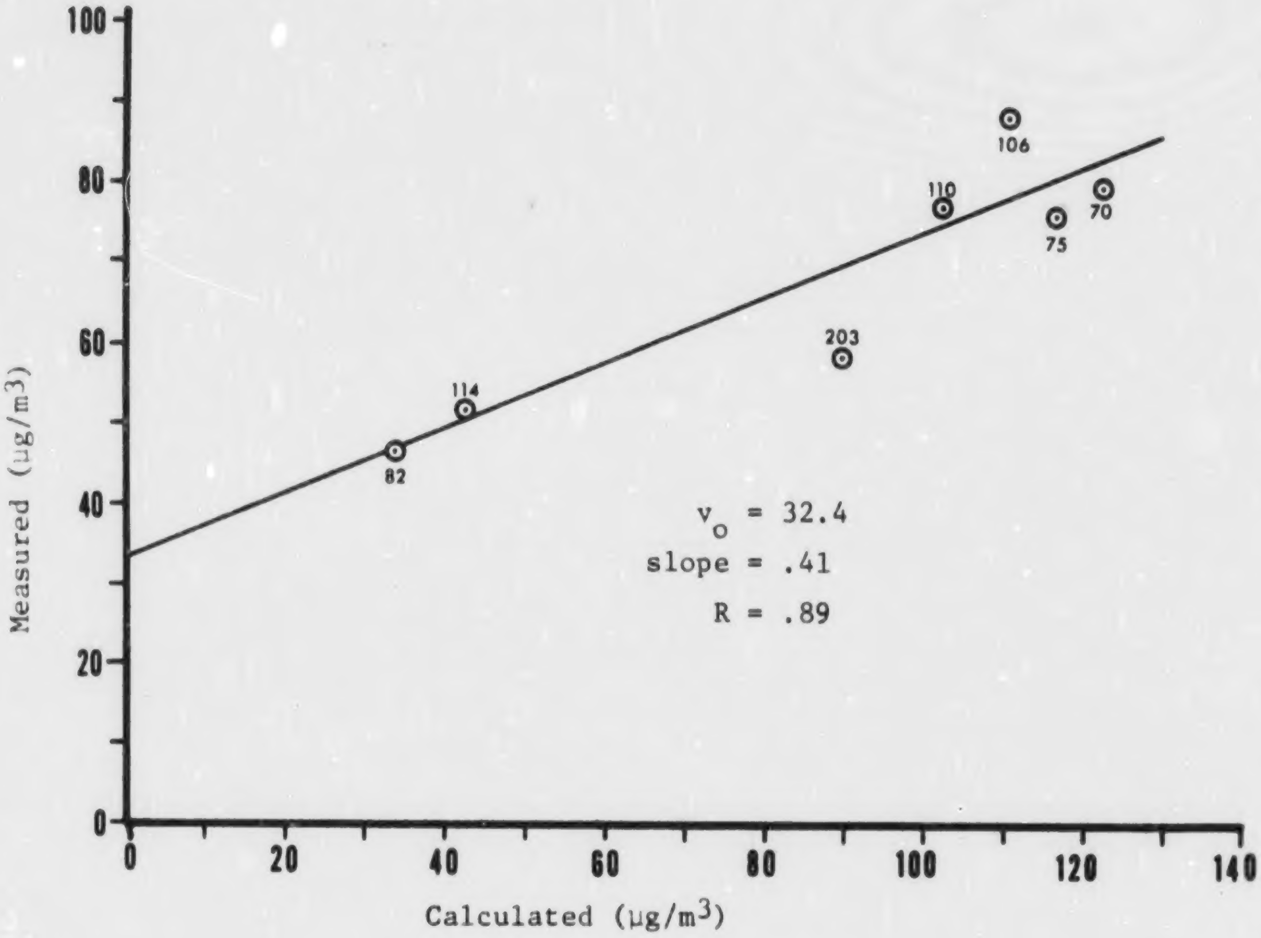
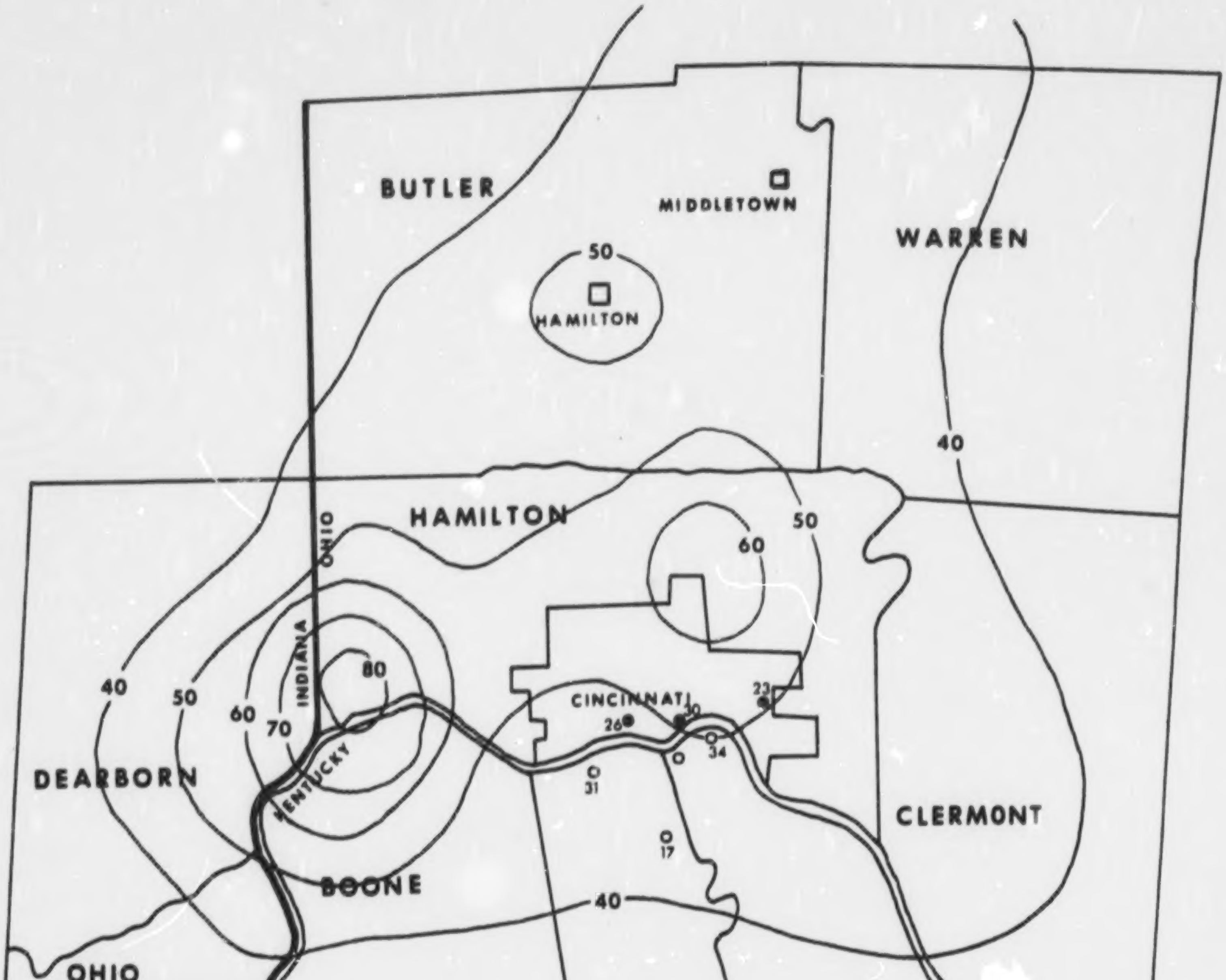


Figure 2-5. WINTER SULFUR OXIDES MODEL VERIFICATION (November 1969 - January 1970)



● NASN

○ Northern Kentucky Network

Concentration in $\mu g/m^3$

Figure 2-6. ANNUAL MEAN CONCENTRATION OF SULFUR OXIDE AS MEASURED AT SELECTED SAMPLING STATIONS AND ANNUAL ARITHMETIC MEAN CONCENTRATIONS AS ESTIMATED BY DIFFUSION MODEL

Figure 2-6 shows the available annual average sulfur dioxide measurements taken in the MCIAQCR during 1968-1969. The Northern Kentucky Network was operated from August 1968 through April 1969. The National Air Sampling Network (NASN) sites shown represent averages for the calendar year 1969. Also shown in Figure 2-6 are the annual average isopleths predicted by the computerized atmospheric diffusion model. (See Sections 2.2 and 2.3). It should be noted that the concentration values show as model predictions (isopleths) and those from NASN stations are presented as annual arithmetic means. Kentucky's sampling results are displayed on an annual geometric mean since the adopted Air Quality Standard in that state is in terms of a geometric mean. Comparison can be made between the two sets of values by increasing the Kentucky values by about 20%.

It is obvious from an examination of Figure 2-6 that the model predictions and measured air quality data are not in agreement. The model appears to be over-predicting by a factor of approximately two in the area of the sampling stations. This indicates that the verification developed for the diffusion model during the winter season is not applicable when projected to annual average conditions. Unfortunately, the annual data presented in this section was found to be inadequate for model verification because of lack of range in sampled values and the lack of proper geographical coverage. The results presented in Figure 2-6 are discussed further in Sections 2.3.2 and 2.4.3.

It was apparent from the comparison of verified model estimates and annual average measurements (by the West-Gaeke technique) that the winter verification which had been done did not accurately reflect the annual average sulfur dioxide concentrations in the MCIAQCR. Since it was impossible to verify the model on an annual basis it was decided to abandon the computer simulation technique for the evaluation of sulfur oxide control strategies.

2.4 CONTROL STRATEGY SELECTION

2.4.1 Particulate Control Strategies

A total of 18 particulate control strategies was tested in the simulation exercise. Each of these strategies specifies an allowable emission level for each type of source within the region (e.g., fuel combustion, industrial process and solid waste disposal).

1. Existing Control Regulations Through the Region
   This strategy displayed the air quality resulting from complete compliance with existing control regulations in the MCIAQCR. Figure 2-7 shows existing fuel combustion standards. Table 2-1 indicates existing standards for industrial processes and describes existing solid waste disposal standards.

2. Most Stringent Existing Regulations Applied Through Region
   Emission standards for fuel combustion, industrial processes, and solid waste disposal were taken from the existing regulations of Kentucky, Indiana, and Cincinnati, respectively.

3. Most Stringent Existing Fuel Combustion, Second-Most Stringent Industrial Process Regulation
   Emission standards for fuel combustion, industrial processes, and solid waste disposal were taken from the regulations of Kentucky, Indiana, and Cincinnati.

4. Most Stringent Industrial Process Regulation, Second-Most Stringent on Fuel Combustion
   Industrial process and solid waste disposal standard as for Strategy 2, with Cincinnati's fuel combustion control standard.

5. Cincinnati Particulate Regulations Applied Throughout the Region

6. Maximum Technology Control
   This strategy allows fuel combustion sources to switch to natural gas and eliminates all incineration. Industrial process sources are controlled with the most effective control device, usually in fabric filter or efficient electrostatic precipitation.

7. Maximum Technology Control without Fuel Switching
   This strategy allows fuel combustion control with the best

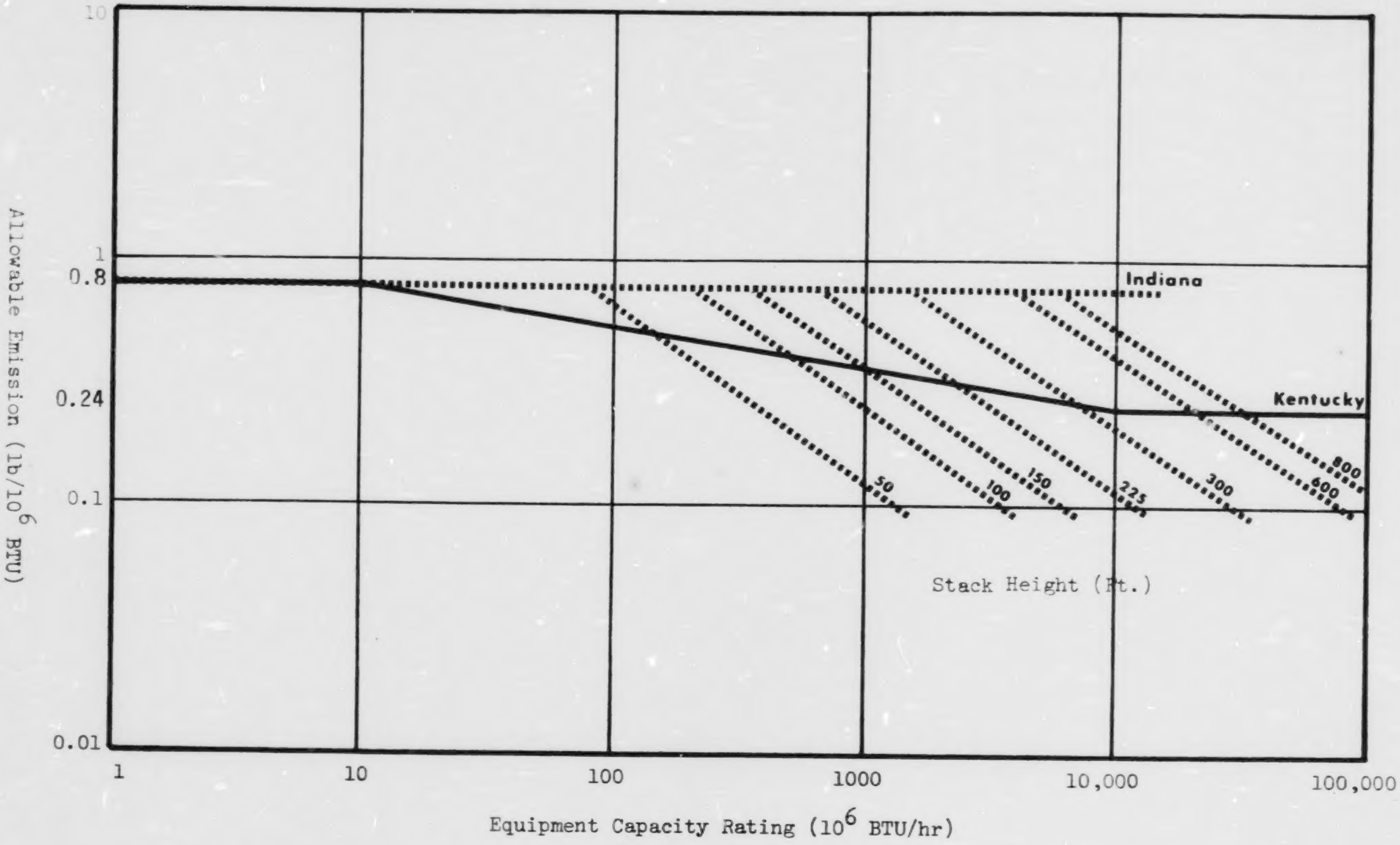


Figure 2-7. Existing Emission Standards in the MCIAQCR Based on Input Heat Capacity

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Table 2 - 1(A) Existing Particulate Emission Standard for Industrial Process Sources (City of Cincinnati Regulation)

Effective Height of Process Vent, ft[(a)]	Allowable Emissions lb/hr [(a)]
Up to 50	4
75	10
100	17
125	27
150	40
175	53
200	68
225	88
250	110
275	130
300	160

(a) Allowable Emissions for intermediate heights shall be determined by linear interpolation.

(B) Standard for particulate emissions from incinerators: 0.4 pounds of particulate matter per 1000 pounds of discharged gases adjusted to 12 percent CO_2. (City of Cincinnati) available control device applied. Other sources are controlled as in strategy number 6 above.

8. Maximum Technology Control with Fuel Switching, Solid Waste Disposal Control To Level of Existing Cincinnati Standard

9. Most Stringent Existing Regulations, Maximum Technology Without Fuel Switching
   Industrial processes and solid waste disposal are controlled to same level as in Strategy 1.

10. Most Stringent Set of Control Standards, Not Maximum Technology
    Stringent heat input curve for fuel combustion sources (Figure 2-8A) process weight curve for industrial processes (Figure 2-9A) and 0.05 grains/scf allowable emissions for incinerators.

11. Same As Strategy 10 with Relaxation of Solid Waste Disposal Standard
    Incinerator emission must be controlled to 0.2 grains/scf.

12. Same as Strategy 10 with Process Weight Standard for Industrial Process Emissions as Shown in Figure 2-9B

13. Same as Strategy 11 with Process Weight Standard (Figure 2-9B

14. Same as Strategy 10 with Heat Input Standard for Fuel Combustion Sources as Shown in Figure 2-8B

15. Same as Strategy 11 with Standard for Fuel Combustion (Figure 2-8B)

16. Same as Strategy 12 with Standard for Fuel Combustion (Figure 2-8B)

17. Same as Strategy 13 with Standard for Fuel Combustion (Figure 2-8B)

18. Potential Emission Standard
    This standard relates the allowable emissions for each source to its uncontrolled or potential emissions. Standard is applied to all source categories and is displayed in Figure 2-10.

This set of strategies represents a blend of control standards existing in the Region, theoretical maximum control levels, and control standards developed and used in other parts of the country. Simulation of

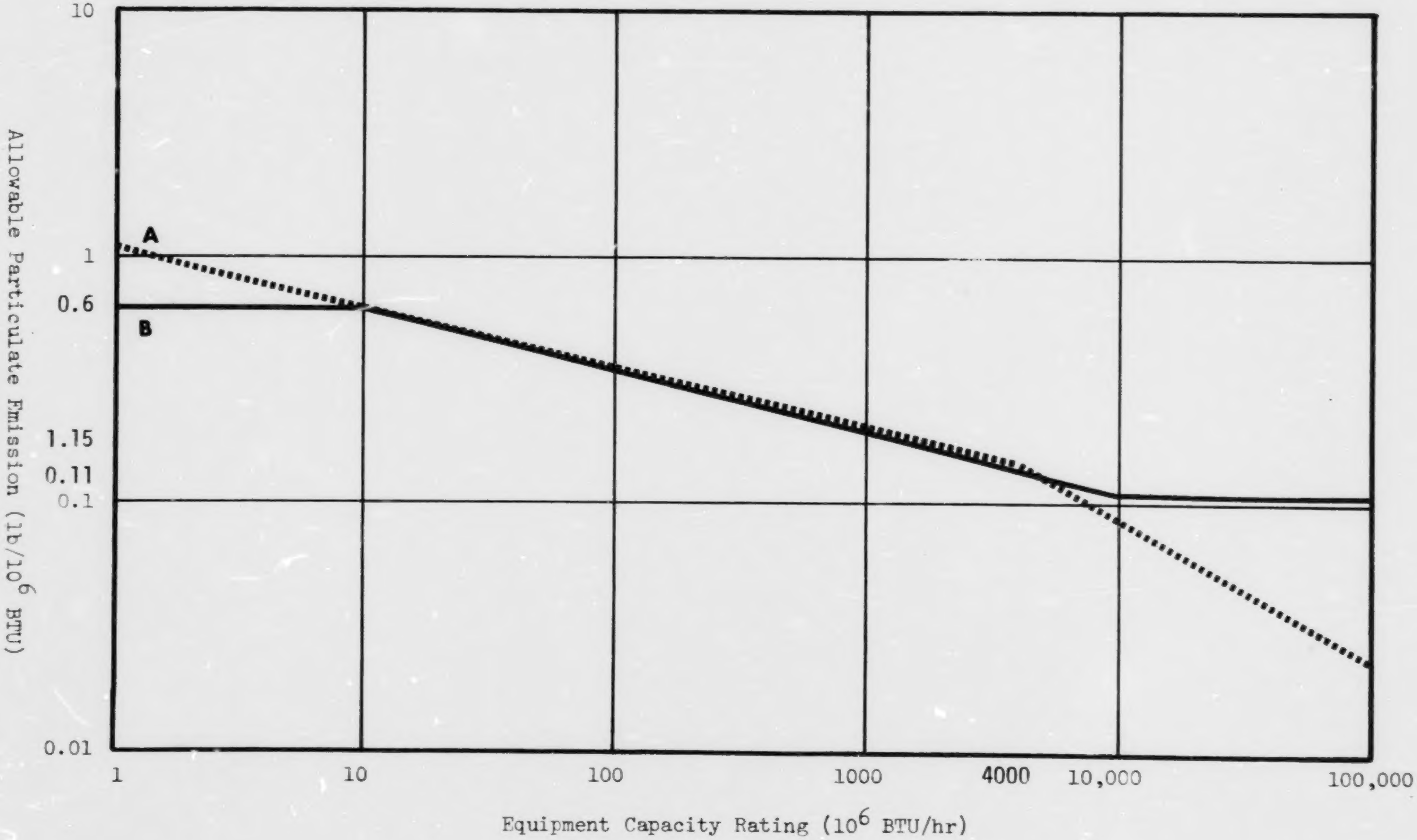


Figure 2-8. Additional Heat Input Type Standards Tested in Proposed MCIAQCR Particulate Control Strategies.

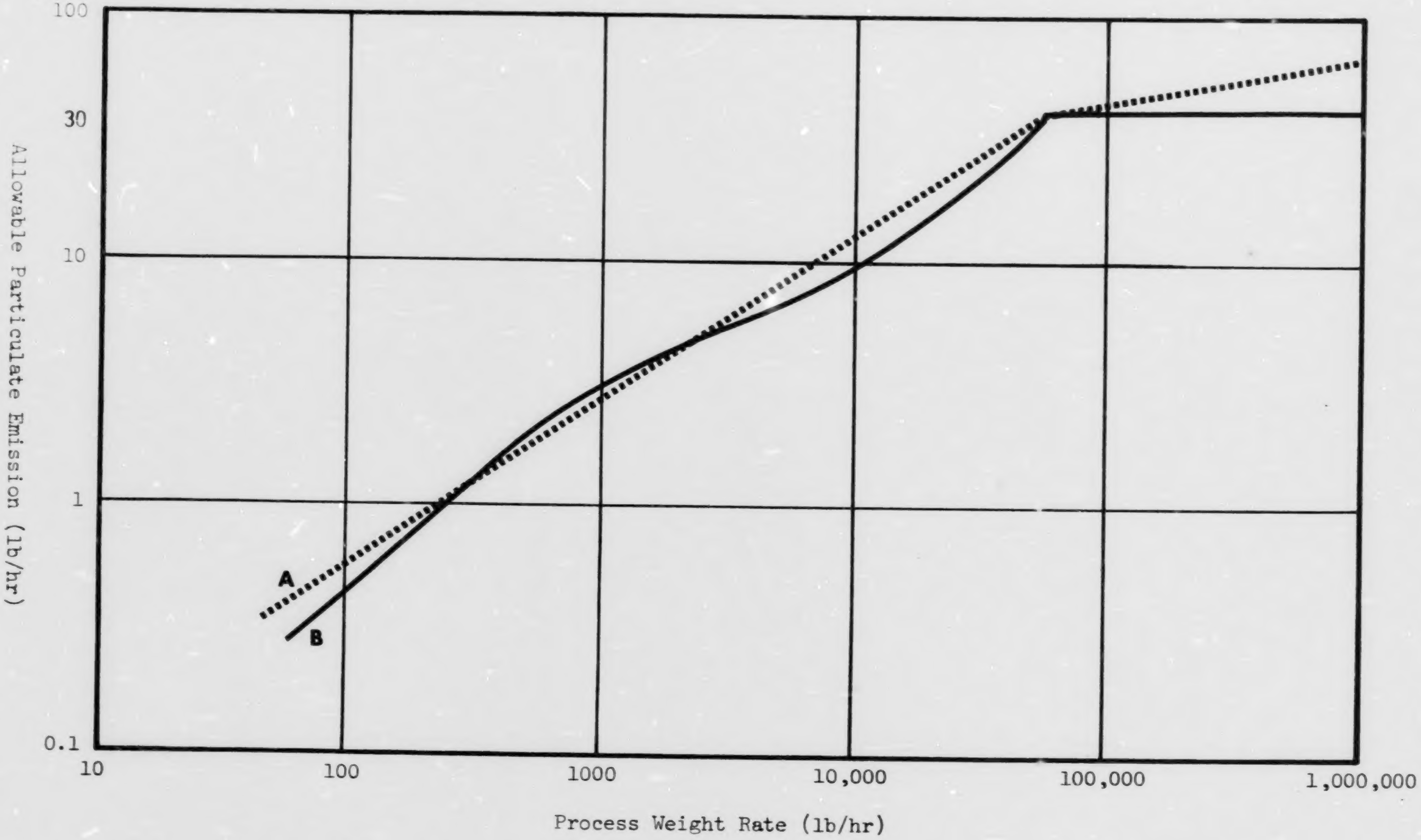
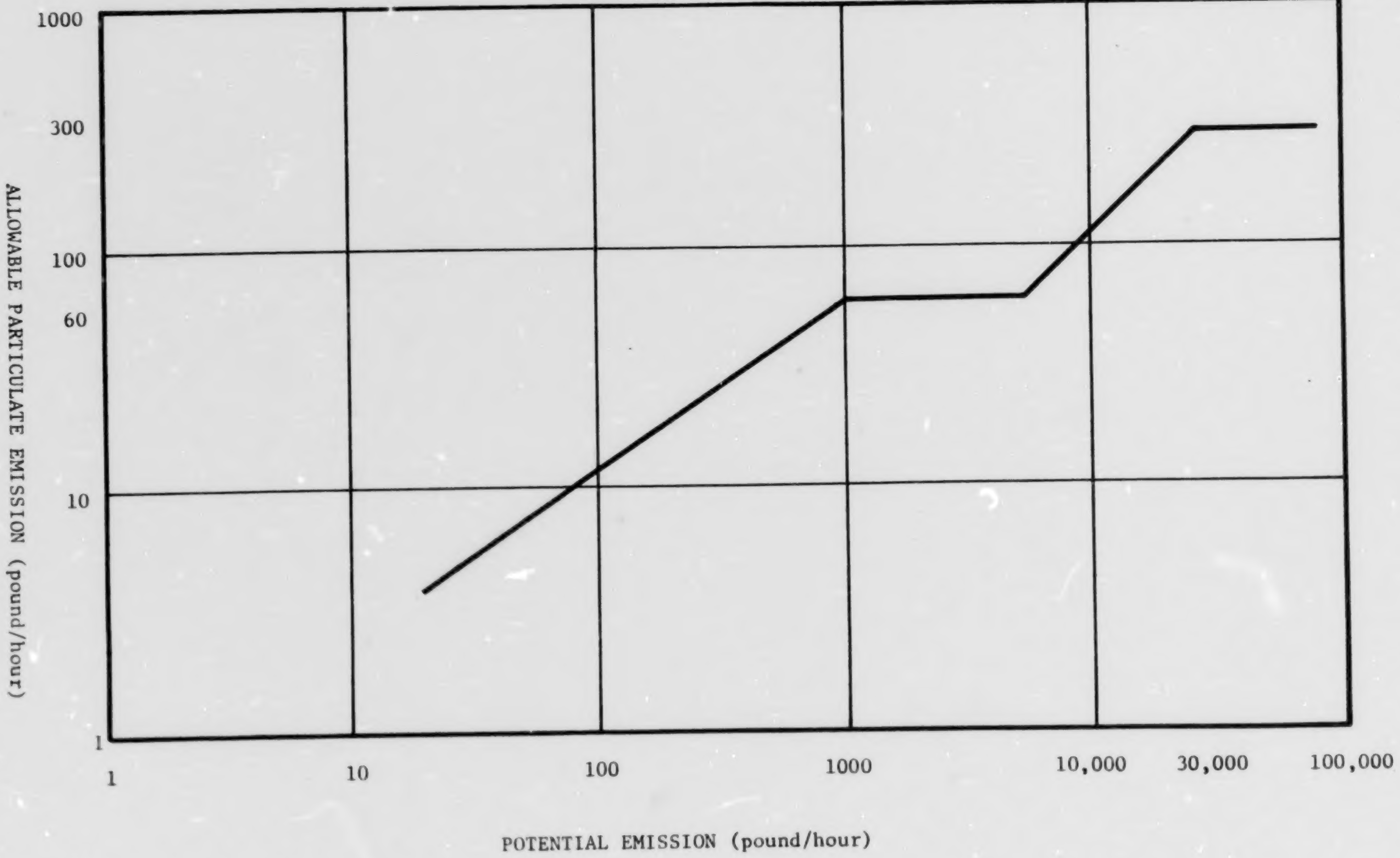


Figure 2-9. Two Sets of Emission Standard Curves for Industrial Process Type Emissions Used in the Particulate Control Strategies Evaluated for the MCIAQCR.

Figure 2-10. ALLOWABLE PARTICULATE EMISSIONS BASED ON THE POTENTIAL OR UNCONTROLLED SOURCE EMISSIONS APPLIED TO INDUSTRIAL PROCESS, FUEL COMBUSTION, & SOLID WASTE DISPOSAL



these standards with the resulting ground level concentration values and required emission reductions allows an informal choice regarding that set of control standards most suited to the needs of the MCIAQCR.

2.4.2 Particulate Simulation Results

After the 18 particulate control strategies described in the previous section were selected, a control strategy simulation was carried out. This simulation predicted ground level particulate concentrations on the basis of the verified atmospheric diffusion model discussed in Section 2.3.

Table 2-2 provides a brief summary of the results of this exercise. The task at this stage was to select a small group of potentially feasible control alternatives for further detailed analysis. The two receptor sites noted in this tabulation were selected as being roughly descriptive of the overall regional air quality.

Three relatively distinct groups of control strategies can be defined in Table 2-2. The first group consists of Strategies 1 through 5 and essentially represents various combinations of emission standards already being applied in political jurisdictions within the MCIAQCR. In general, these strategies had a fairly low regional cost and could be administered rather easily. None of them, however, appeared to give promise of achieving regional air quality standards of 65 $\mu g/m^3$ (75 $\mu g/m^3$ in Indiana). It was decided that Control Strategy 1, existing regulations, should be included in the more detailed strategy analysis.

Strategies 6 through 9 represented variations in maximum control technology. In general, these strategies could be characterized by having rather high regional control costs but producing acceptable air quality values. Strategy 7 was included in the more detailed analysis since the strategy should apply the most effective control techniques throughout the region. The administrative acceptability of this type of regulation was not great, but a view of the best control technology was desired in the detailed analysis.

The third group of control strategies, Numbers 10 through 18, represented various combinations of proposed or existing emission control standards from throughout the country. All seemed to produce acceptably low ground level concentrations. Strategies 14 through 17 also were rela-

Strategy Number	Regional Control Cost* ($ in millions)	Selected Receptor Concentration ($\mu g/m^3$)	
		264	269
Existing		134.8	141.8
1	1.7	80.0	83.7
2	3.0	79.5	82.9
3	2.7	79.0	82.6
4	2.2	79.8	83.3
5	1.9	79.3	83.0
6	20.0	63.5	66.5
7	6.4	67.7	70.9
8	5.9	71.0	75.7
9	5.6	71.5	76.6
10	7.0	65.1	68.5
11	6.9	65.3	68.9
12	7.2	64.9	68.3
13	7.0	65.1	68.8
14	3.7	68.8	71.5
15	3.5	64.5	67.8
16	3.9	64.2	67.2
17	3.7	64.3	67.6
18	not tested		

*Control Cost of Point Sources Only

Table 2-2. INITIAL SCREENING OF PARTICULATE CONTROL STRATEGIES

tively low in cost and were considered feasible in terms of practical administrative considerations. Strategies 15 and 18 were selected to complete the group of four strategies for more detailed analysis. (Strategy 18 was not tested in the initial screening but was considered to be similar in stringency to those in the 14 to 17 group.)

After the initial strategy simulation runs, a number of minor errors in the emission inventory data base was discovered and corrected. Certain suspected program malfunctions were also investigated. The more detailed control strategy summaries cannot be compared with the output presented in Table 2-2. The general results, however, were similar in both cases.

Table 2-3 presents more complete information on those strategies selected during the initial screening procedure. The maximum receptor concentration occurring after application of each strategy is presented. Also, the emission reduction percentages are shown for both point and area sources and the new emission rates for these categories.

Strategy 1, existing regulations, appears totally unlikely to achieve satisfactory regional air quality and was dismissed from further consideration.

The maximum concentrations reported for the other control strategies must be interpreted with a certain degree of care. Only for strategy 15 was a reduction in area source emissions projected. This was done as a test to determine the effect this factor had on receptor concentrations. It was felt on the basis of reduction in open burning throughout the region and trend in fuel usage toward natural gas and away from coal for small fuel users that this degree of reduction would be reasonable for any of the three strategies. On this basis the maximum concentration would be least (probably between 60 and 65) for Strategy 7. Strategy 18 would be essentially equal to Strategy 15. Since all three control strategies appear to be able to achieve the regional air quality standards within the limits of simulation modeling accuracy, the final selection of a control strategy to be proposed for the MCIAQCR was left to practical administrative and technical considerations.

Strategy 7 was considered to be quite difficult to administer and since its regional cost nearly doubled that of the other two strategies, it was eliminated.

	POINT SOURCES		AREA SOURCES				
Strategy Number	Percent Reduction	New Emissions Rate (ton/day)	Percent Reduction	New Emission Rate (tons/day)	$\$ \times 10^6$	$/ton removed	Maximum Receptor (μg/m3)
Existing		386.7		212.6			150.5
1	72.3	102.5	--	212.6	1.6	15.	137.9
7	97.1	11.7	--	212.6	6.1	44.	76.1
15	89.2	41.8	33.	142.4	3.3	26.	69.2
18	87.1	49.0	--	212.6	3.4	28.	81.9

Table 2-3. DETAILED RERUN OF SELECTED GROUP OF STRATEGIES FOR MCIAQCR

Strategy 15 was chosen over Strategy 18 since it contains more familiar types of emissions standards. For this reason it was considered to be politically more acceptable and administratively easier to handle.

A detailed breakdown of the emission reductions required under Strategy 15 is presented in Table 2-4. Examination of this table, coupled with a review of particular source-control device combinations, lead to the conclusion that although significant emission reductions are required, they are not beyond the state-of-the-art in control technology.

An isopleth plot of ground level particulate concentrations after application of this strategy, as shown in Figure 2-11. Comparison with the plot of existing concentrations (Figure 2-6) graphically shows the improvement in regional air quality expected following application of Control Strategy 15.

To insure that the selected set of control standards would indeed be able to achieve and maintain acceptable air quality levels over the next several years, an exercise was carried out to project emission rates to the year 1980. These projections were based on economic projections for the MCIAQCR supplied by the United States Department of Commerce. Factors with which to scale existing emission levels were developed for each industrial classification. The revised emission rates expected for the year 1980 are displayed in Table 2-5. Factors were developed to project emission levels based on the 1969 emission inventory to a 1980 basis. These projections were by industrial and commercial categories. The same percentage control of emissions that is currently required was assumed to continue thooughout the projection period. As can be seen, the overall regional emission rate actually declines slightly during this ten-year period. The decline is basically due to large increases projected for relatively nonpolluting industrial classifications and to a change in regional fuel usage toward increased use of natural gas and oil. Based on this anaylyis the emission standards comprising Particulate Control Strategy 15 appears to be suitable to the needs of the MCIAQCR. Figure 2-12 displays the projected ground level concentrations for 1980.

			SOURCE CLASSIFICATION				
			Industrial				
Political Jurisdiction	Area	Apartment Commercial Government	Fuel Combustion	Process	Power Plants	Solid Waste	Total
Cincinnati							
Existing	8030	708	2464	365	0	1555	13,122
Controlled	5402	354	650	365	0	376	7,147
% Reduction	32.7	50.0	73.6	0	0	75.8	45.5
Indiana							
Existing	1679	0	894	91	23,634	489	26,787
Controlled	1131	0	117	91	1,482	0	2,821
% Reduction	32.6	0	86.9	0	93.7	100	89.5
Kentucky							
Existing	4526	44	18	7490	0	529	12,607
Controlled	3029	29	18	544	0	0	3,621
% Reduction	33.1	33.3	0	92.7	0	100	71.3
Ohio							
Existing	19012	0	22177	16,969	58,104	5592	121,855
Controlled	12738	0	3099	2,427	5,577	124	3,966
% Reduction	33.0	0	86.0	85.7	90.4	97.8	80.3
Region							
Existing	33248	752	25554	24,915	81,738	8165	174,371
Controlled	22301	383	3884	3,427	7,059	500	37,555
% Reduction	32.9	49.0	84.8	86.3	91.4	93.9	78.5

TABLE 2-4 . PARTICULATE EMISSIONS FOLLOWING APPLICATION OF PROPOSED EMISSION STANDARDS BASED ON 1969 EMISSION INVENTORY. (TONS OF PARTICULATE/YEAR)

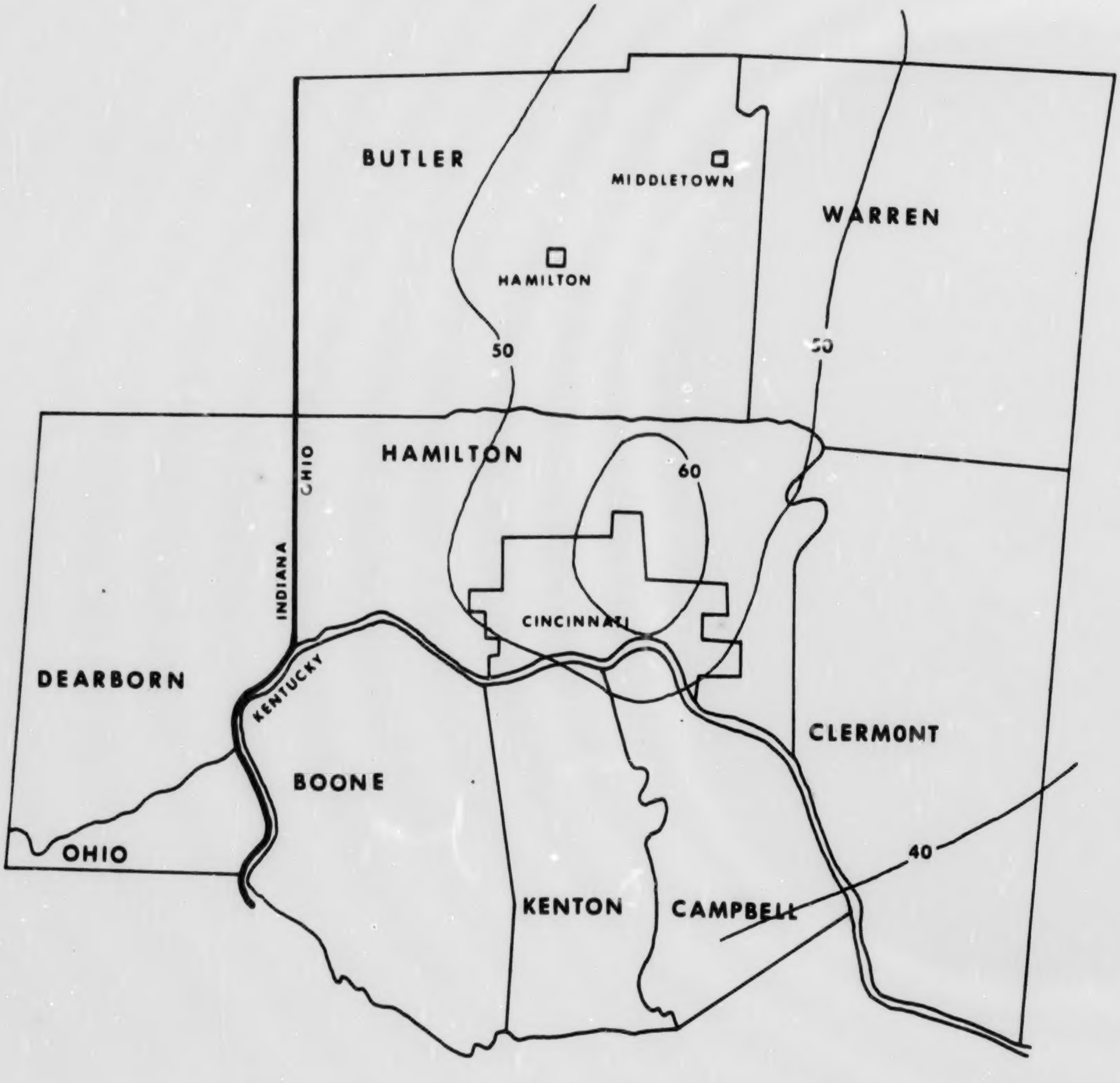


Figure 2-11. Predicted Ground Level Concentrations Following Application of Proposed Control Strategy (1969 Emission Inventory)

Note: Annual Average Concentrations in $\mu g/m^3$

			SOURCE CLASSIFICATION				
			Industrial				
Political Jurisdiction	Area	Apartment Commercial Government	Fuel Combustion	Process	Power Plant	Solid Waste	Total
Cincinnati							
Existing	8030	741	3467	434	0	5209	17,881
Controlled	5402	369	912	434	0	1259	8,377
% Reduction	32.7	50.0	73.6	0	0	75.8	53.2
Indiana							
Existing	1679	0	1172	139	23,634	1639	28,262
Controlled	1131	0	153	139	1,482	0	2,905
% Reduction	32.6	0	86.9	0	93.7	100.0	89.7
Kentucky							
Existing	4526	55	22	9191	0	1774	15,567
Controlled	3029	36	22	668	0	0	3,756
% Reduction	33.1	33.3	0	92.7	0	100.0	75.9
Ohio							
Existing	19012	0	31467	20279	9,213	18732	98,703
Controlled	12738	0	4398	2902	887	416	21,342
% Reduction	33.0	0	86.0	85.7	90.4	97.8	78.4
Region							
Existing	33248	796	36128	30043	32,846	27353	160,414
Controlled	22301	405	5485	414	2,369	1675	37,380
% Reduction	32.9	49.1	84.8	86.2	92.8	93.9	77.3

TABLE 2-5. PARTICULATE EMISSIONS FOLLOWING APPLICATION OF PROPOSED EMISSION STANDARDS BASED ON PROJECTED 1980 EMISSION LEVELS. (TONS OF PARTICULATES/YEAR)

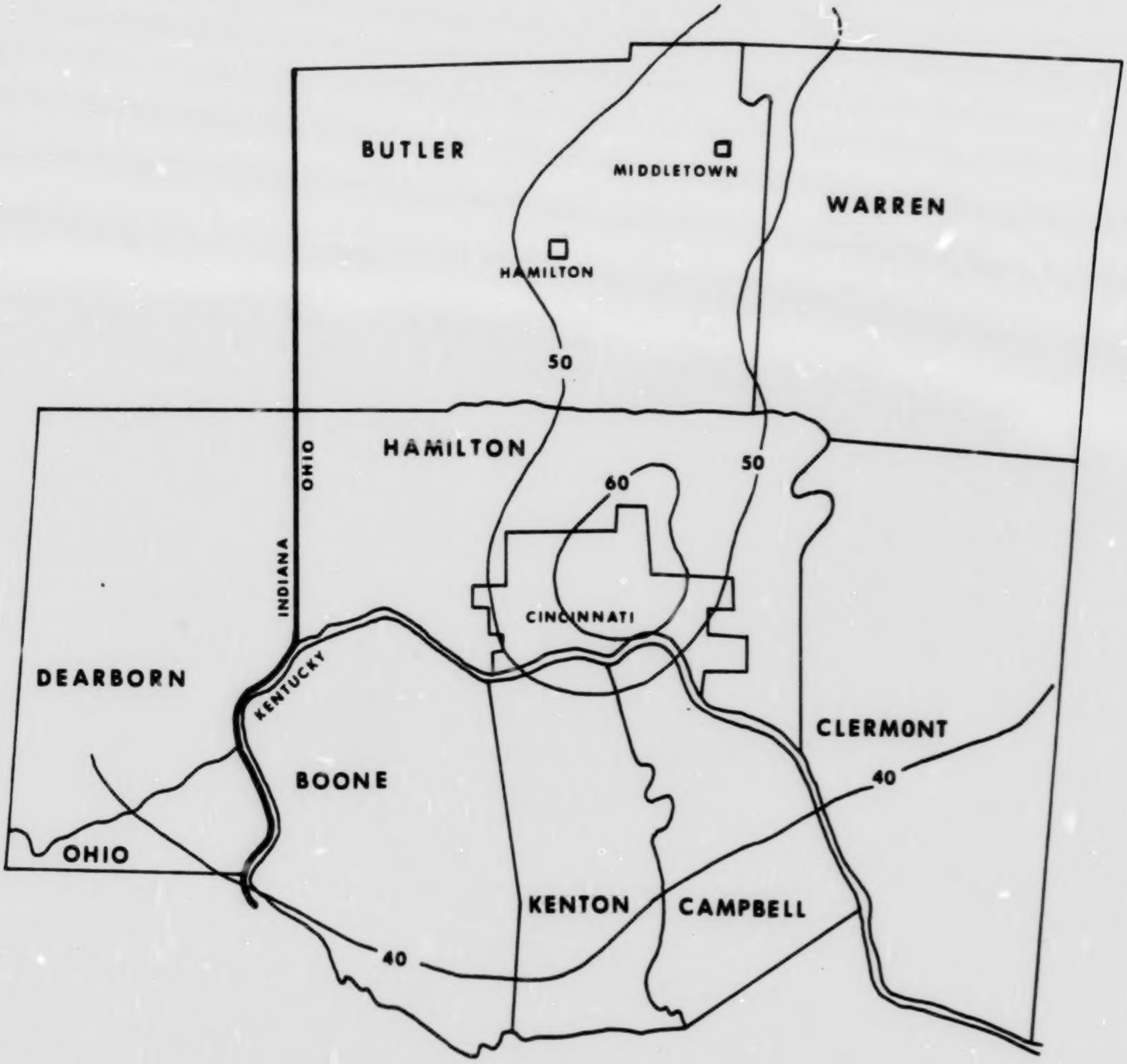


Figure 2-12. Projected Ground Level Particulate Concentration Following Application of Proposed Control Strategy (Projected 1980 Emission Levels)

Note: Annual Average Concentration in $\mu g/m^3$

2.4.3 Sulfur Oxides Control Strategy

It was not possible on the basis of available air quality and emission data to develop a suitable annual verification of the diffusion model for sulfur oxides. (See Section 2.3.2.) Control strategy development for this pollutant had to be undertaken by the use of rollback considerations. (The computer simulation exercise, however, was still performed on a limited group of control strategies. The amount of pollutant reduction required under various emission reduction plans is necessary input to this strategy section procedure. Four sulfur oxide control strategies were simulated on a regional basis. Each of these strategies applied specific restrictions to the fuels used within the MCIAQCR. The four strategies, in order of increasing stringency, are defined as follows:

1. Limitation of all fuel to 1.25% sulfur content or less
2. Limitation of all fuel to 0.8% sulfur content or less
3. Limitation of all fuel to 0.3% sulfur content or less
4. Switch of all combustion sources to the use of natural gas

On an annual basis, the limited air quality data for SO_2 available in the MCIAQCR indicate that ambient SO_2 levels are not exceeding the Air Quality Standard (Ohio and Indiana) of 43 $\mu g/m^3$. On a short-term basis, however, the existing levels exceed the standards. This is discussed in more detail in Section 1.7.

During the three-month effort to collect data for this study (November 1969 through January 1970) periods were observed during which the average for 24 hours and for one hour were higher than allowed by the standard. At sampling station number 77(located in Ohio),the maximum hourly average was 1000 $\mu g/m^3$. This is compared with an Air Quality Standard (Ohio and Kentucky) for the maximum one-hour average in any year of 858 $\mu g/m^3$. Since the sampling only covered a period of three months, a minimum reduction of 14% in ambient air quality is required to comply with air quality standards.

During this same period, sampling station number 70 (located in Ohio) recorded a maximum 24-hour average of 371 $\mu g/m^3$. The maximum 24-hour average allowed by the Air Quality Standards (in all jurisdictions*) is 286 μg/m^3. An overall reduction in sulfur dioxide pollution levels of 23% will be required to bring this value into compliance with the standards. The observations cited in this and the preceding paragraph indicate that air pollution levels need to be reduced approximately 20 to 25%.

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*Ohio's standard specified that this value shall not be exceeded more than 1% of the time.

An examination of continuous air monitoring data collected over a period of six months is shown in Table 2-6. These data also reveal the existence of undesirably high, short-term, sulfur dioxide concentrations. In particular, the hourly maximum for April 1970 was 1550 μg/m^3. This value exceeds the adopted air quality standard of 858 for this averaging time by about 45%. These excessive short-term concentrations illustrate the need for a regional reduction of sulfur oxides emissions.

A reduction of each sulfur oxide source in the region by the specified percentage is not an administratively attractive nor technically sound control alternative. Since the majority of this type of pollutant emission is generated by fuel combustion, various control alternatives limiting allowable fuel sulfur content were examined. Reduction of the allowable sulfur content in fuels to 0.3% or 0.8% produced greater emission reductions than would seem to be required by the observational data cited above. The application of the existing City of Cincinnati fuel sulfur content regulation throughout the region was determined to produce sufficient emission reductions. This regulation has been proven to be technically and administratively feasible in one of the political jurisdictions comprising the MCIAQCR and is recommended in this implementation plan as the basis for a regionwide sulfur oxides control strategy. A slight change to the existing Cincinnati regulations is proposed for non-power plant fuel combustion sources. According to the detailed emission inventory information compiled for this study, nearly all smaller fuel users within the region are already using fuel with less than 1.0% sulfur content. Accordingly, to prevent increases in emission from these source categories, the proposed limitation on sulfur content in fuels not used for electrical power generation is set at 1.0%.

Table 2-7 displays the emission reductions required by the adoption of this strategy on a regionwide basis. By far, the greatest reduction in sulfur oxide emissions occurs in the electric power generation source category. This reflects the fact that these sources are the only significant users of high sulfur fuels in the region. This pattern of emission reduction

Table 2-6. AMBIENT SULFUR DIOXIDE CONCENTRATIONS AS MEASURED AT THE CAMP STATION, CINCINNATI

Period	Arithmetic Mean Concentration*	24-Hour Maximum*	One-Hour Maximum*
January 1970	136	286	675
February 1970	94	186	758
March 1970	68	305	780
April 1970	55	251	1550
May 1970	31	106	638
June 1970	24	106	492

*All concentrations are in units of $\mu g/m^3$.

SOURCE CLASSIFICATION

Political Jurisdiction	Area	Apartment Commercial Government	Fuel Combustion	Process	Power Plants	Solid Wastes	TOTAL
Cincinnati							
Projected	7,227	1,576	3,398	0	0	390	12,592
Controlled	7,227	1,576	3,398	0	0	390	12,592
% Reduction	0	0	0	0	0	0	0
Indiana							
Projected	1,204	0	1,328	0	123,844	14	126,392
Controlled	1,204	0	1,328	0	50,895	14	53,443
% Reduction	0	0	0	0	58.9	0	57.7
Kentucky							
Projected	3,029	102	0	0	0	14	3,146
Controlled	3,029	102	0	0	0	14	3,146
% Reduction	0	0	0	0	0	0	0
Ohio							
Projected	12,632	0	25,017	8,584	196,052	2,047	244,334
Controlled	12,632	0	20,856	2,609	93,206	2,047	131,352
% Reduction	0	0	16.6	69.6	52.5	0	46.2
REGION							
Projected	24,093	1,679	29,743	8,584	319,896	2,467	386,465
Controlled	24,093	1,679	25,582	2,609	144,102	2,467	200,534
% Reduction	0	0	14.0	69.6	55.0	0	48.1

Table 2-7. **EFFECT OF PROPOSED SULFUR OXIDES CONTROL STRATEGY ON MCIAQCR EMISSION LEVELS (tons of pollutant/year)(based on 1969 Emission Inventory)**

appears to be consistent with the goal of reducing maximum short-term ambient concentrations. Large emission sources are very important under the unfavorable meteorological conditions which cause the highest hourly and daily concentrations.

Table 2-8 displays the result of the projection of regional growth and the associated sulfur oxide emissions to the year 1980. Despite projected regional population and commercial growth, the expected levels of sulfur oxide emissions remain fairly constant. For this reason, it appears that the proposed control strategy, as described above, will be adequate to achieve and maintain air quality standards during this period.

2.5 PROPOSED CONTROL STRATEGY

The following emission control strategies were selected for adoption throughout the MCIAQCR on the basis of procedures and considerations presented in the preceding section (2.4). These strategies represent emission limitation standards which, when adopted and enforced, should lead to acceptable levels of both suspended particulate and sulfur dioxide as defined by the regional Air Quality Standards. Legally enforceable control regulations based on these emissions standards are presented in Section 4.2.

The proposed particulate control strategy consists of emission standards covering three general categories of emissions sources:

- Industrial Process Emissions

  Sources within this category are allowed emissions based on process weight as defined by curve A, Figure 4-11 covering this source category. (This standard is fully defined in Section 4.2, Proposed Control Regulations.)

- Fuel Combustion Emissions

  Allowable emissions are defined according to the curve B, Figure 4-10 for heat input versus mass particulate emission rate. (This standard is also presented in Section 4.2)

- Solid Waste Disposal

  Incinerators are allowed emissions of 4 pounds/ton of refuse charged and open burning is prohibited under the standard relating to this source category.

The proposed regional sulfur oxides control strategy consists of those emissions standards on which the regulations already in effect in the City of Cincinnati are based. Two emission categories are considered by these standards:

SOURCE CLASSIFICATION

Political Jurisdiction	Area	Apartment Commercial Government	Fuel Combustion	Process	Power Plants	Solid Wastes	TOTAL
Cincinnati							
Projected	7,227	1,569	4,883	0	0	1,306	14,986
Controlled	3,431	1,569	4,883	0	0	1,306	11,190
% Reduction	52.5	0	0	0	0	0	25.3
Indiana							
Projected	1,204	0	1,741	0	123,844	47	126,837
Controlled	547	0	1,741	0	50,900	47	53,652
% Reduction	52.5	0	0	0	58.9	0	57.7
Kentucky							
Projected	3,029	138	0	0	0	47	3,215
Controlled	1,423	138	0	0	0	47	1,609
% Reduction	52.5	0	0	0	0	0	49.9
Ohio							
Projected	12,632	0	35,058	13,041	76,536	6,858	144,127
Controlled	6,000	0	29,238	3,963	36,355	6,858	77,540
% Reduction	52.5	0	16.6	69.6	52.5	0	46/2
REGION							
Projected	24,093	1,708	41,683	13,041	200,381	8,259	289,167
Controlled	11,402	1,708	35,847	3,963	90,171	8,259	150,077
% Reduction	52.5	0	14.0	69.6	55.0	0	48.1

Table 2-8. EMISSIONS FOLLOWING APPLICATION OF PROPOSED SULFUR OXIDES CONTROL STRATEGY BASED ON 1980 EMISSION PROJECTIONS (tons of pollutant/year)

- Industrial Process Emissions

  Sulfur oxide emissions from industrial process are limited to 2000 parts per million by volume of the exhaust gas stream. Acid plants shall control to 36 pounds/ton acid for sulfuric acid plants.

- Fuel Combustion Emissions

  The maximum sulfur content of fuel used shall be 1.25% with 1.00% being the allowable limit for smaller combustion sources.

2.6 TIMETABLE FOR IMPLEMENTING PROPOSED REGULATIONS

Implementation of control regulations logically divides into two separate tasks. First, the new regulation must be officially adopted by the responsible state agency. Second, field enforcement and control of pollution sources affected by the regulation must be carried out. The length of time required to carry out these actions are discussed in the following two sections.

2.6.1 Adoption of Proposed Control Regulations

The Kentucky Air Pollution Control Commission has been granted by the State Legislature all the powers necessary to hold public hearings and adopt control regulations. Since no additional powers are needed, the process can begin immediately upon submission of this Implementation Plan. The following steps will be carried out in this effort.

1. Prepare proposed control regulations in appropriate legal form.

   Section 4.2 of this document indicates the general form the control regulations should take. Administrative considerations may require redrafting. Time required will be one month.

2. Hold public hearings

   This is a necessary step in assuring public acceptance and cooperation with the expanded air pollution control activities proposed in this document. Time required will be one month.

3. Final adoption

   It will be necessary to incorporate changes or additions deemed acceptable following the public hearings, and possibly a final hearing would be necessary at this stage. This step will require from one to two months.

Thus, three to four months will be required to adopt legally enforceable control regulations based on the control plan.

2.6.2 Enforcement of Control Regulations

The primary portion of the Kentucky enforcement program will be the permit and source surveillance system described in Section 6.2. The basic permit system is already established in Kentucky APC Commission Regulations so that the major potential enforcement obstacles will be acquiring proper staff in its portion of the MCIAQCR. It is anticipated that source registration and surveillance procedures and the permit system will be fully operational by January 1972 following the submission of this document. State actions to begin to achieve compliance with the proposed control regulations will begin well before this time.

Particulate emission sources should be brought substantially into compliance with the new regulation by June 1972. There are no new control technologies necessary to bring particulate emission sources into compliance with the proposed standards. The approximate 18-month period allowed for compliance after the adoption of the control regulations allows pollution sources an opportunity to design, fabricate or purchase, and install necessary control devices.

The regulations relating to sulfur oxides emissions control may require a longer period in which to achieve compliance. Choice of the most satisfactory control method is usually made by the source after all of the various technical, economic, political and social factors are given serious consideration. The options for fuel substitution are numerous. Natural gas, low sulfur fuel oil, low sulfur coal, and coal derived gas or oil are available or can be made available at a price. Although considerable pilot plant work has been conducted and many processes are commercially available, the application of full-scale flue gas desulfurization processes to coal-fired power plants is limited. As soon as possible, but not later than six months after the adoption of the proposed control regulations, the applicable sources will be required to submit a control plan of how they will come into compliance. The control plans should cover no more than a two-year period. Therefore, by July 1973 the sources will be in compliance. During this period, the data from the air quality monitoring network will be closely observed to determine the exact trends in the sulfur dioxide concentrations in the Region. If this data indicates that additional control is needed, the Implementation Plan will be modified accordingly.

3. LEGAL AUTHORITY

3.1 SCOPE OF DISCUSSION

This section will address itself to legal deficiencies and remedies of the various aspects of air pollution control as they relate to the State of Kentucky. Generally, the discussion will be confined to the adequacy of legal authority of the regional entity to fully implement a control program, including the organization of regional enforcement activities, promulgation and enforcement of regulations, and implementation of emergency action. However, the legal aspects of the proposed emission and control regulations are not discussed in this section.

In general, the format of this chapter is designed to identify the legal problems which exist in Kentucky and the legislative and regulatory action necessary to remedy the deficiencies found in the respective programs.

3.2 GENERAL DISCUSSION OF THE POWERS OF ADMINISTRATIVE AGENCIES

It is the general rule that the powers of administrative agencies are limited by the intent of the legislature as expressed in the statutes. That is to say that administrative agencies have no inherent powers.

However, legislative intent may give rise to implied powers and the courts, in interpreting the powers of such agencies, are not limited by the mere words of the statute. This is especially true where the administration of health and safety is concerned. It is a general principle of law that every grant of power carries with it the reasonable use of necessary means for its effective execution. Thus an administrative agency has every power which is indispensable to the powers specifically granted.

Notwithstanding liberal construction as regards health legislation, it is best to expressly endow the agency with the powers necessary to carry out the intent of the legislature. For while the courts may uphold an agency's exercise of implied power, such litigation is time consuming and ought not to be encouraged by lack of legislative specificity. On the other hand, the intent of the legislature may be defeated by subsequent litigation if that body fails to express its intent in the statute.

3.3 CRITERIA FOR EFFECTIVE AIR POLLUTION REGULATION

Compliance with the requirements discussed in the previous section requires that legislative criteria be set. That is, a check list of all the necessary elements of effective air pollution control legislation must be presented to determine that adequate authority is given the agency.

Thus, statutes relative to air pollution regulation must be analyzed to determine that the legislature has expressed its intent and has defined "air pollution" so as to permit the administrative agency to act to prevent conditions which threaten to endanger the public health prior to the occurrence of actual injury. Additionally, the state agency must have sufficient authority to adopt emission regulations and other control regulations, implement emergency action, gather and evaluate air quality and emissions data, require reporting of information, require permits to construct, require permits to operate, grant and repeal variances, inspect facilities, test facilities, issue orders, hold hearings, subpoena witnesses and evidentiary materials, impose penalties, obtain injunctions, and grant enforcement powers to local agencies.

3.4 LEGISLATIVE INTENT

Legislative intent has been expressed in the Kentucky Air Pollution Control Laws.[1] In general, the language provided for protection of public health and, consistent with economics and industrial development, the protection of public enjoyment of the states' air resources. Kentucky Revised Statute §224.320 declares:

> "The Kentucky General Assembly finds that it is necessary ... that there be maintained ... a reasonable degree of purity of the air resources ... necessary for the protection of the public health ...."

While qualifying language had been adopted as regards the intensity of control, it is clear that the protection of public health is declared to be the public policy.

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[1] Kentucky Rev. Stat. §224.320.

3.5 LEGISLATIVE DEFINITION OF "AIR POLLUTION"

Adequate air pollution control can only be realized if the administrative agency has the power to act to protect welfare and property as well as health and, in addition, to prevent conditions which reasonably threaten the public health and welfare. Therefore, it is necessary that the legislative definition of "air pollution" be sufficiently broad to encompass the above factors. Kentucky state laws define air pollution[2] broadly enough to include those conditions which are injurious to property, or which unreasonably interfere with the comfortable enjoyment of life and property. The Kentucky legislation also defines "air pollution" broadly enough to include those conditions which threaten to be injurious. Kentucky Rev. Stat. §224.310 (C) states:

> "Air Pollution" is presence in the outdoor atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as is or threatens to be injurious to human, plant, or animal life, or to property, or which unreasonably interfere with the comfortable enjoyment of life or property;. (Emphasis supplied).

This definition provides an adequate basis for air pollution control efforts in the state.

3.6 POWERS OF THE KENTUCKY AIR POLLUTION CONTROL AUTHORITY

The Air Pollution Control Law of the Commonwealth of Kentucky[3] provides basic enabling authority for the State Air Pollution Control Commission to adopt control regulations, implement emergency action, initiate permit systems, inspect and test facilities and enforce control regulations through a system of administrative orders and hearings, and legal proceedings, including injunction. Table 3-1 analyzes the legal authority and the legislative power grant as it applied to each criterion in July, 1970. This analysis indicates that existing enabling legislation is adequate to allow development and operation of an effective APC program.

Kentucky's original Air Pollution Control Law was deficient in its grant of local control authority.[4] The language provided that the State APC

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[2] Kentucky Rev. Stat. §224.310 (6).

[3] Kentucky Rev. Stat. §§224.310, et seq.

[4] Kentucky Rev. Stat. §224.450.

Commission cede its jurisdiction to local control authorities established in accordance with Chapter 77 of the Kentucky Revised Statutes. However this deficiency was remedied during the 1970 legislative session[5] whereby the state retained its jurisdiction notwithstanding the establishment of local control authorities.

In addition to legislative authority, however, administrative authority is required before the Commission can properly require the reporting of information. State statute[6] requires the Commission to adopt regulations for registration and filing of pertinent information. While current regulations do not specifically address themselves to the above requirement, certain information is required as a prerequisite to obtaining an operating permit.[7] Thus the information required on the permit application forms satisfies the requirements of KRS §224.350.

3.7 IMPLEMENTATION OF EMERGENCY ACTION

As was indicated in section 3.6 Kentucky has sufficient legislation for the implementation of emergency action. In this section, we shall consider this phase of the air pollution control program in greater detail.

Authority has been granted for the Kentucky APC Commission to take immediate action where the executive secretary of the Commission finds that an emergency situation exists.[8] Whenever the condition results from a single source or multiple sources, the secretary may issue an order to abate. Upon issuance of such order the secretary shall fix a place and time, not later than 24 hours thereafter, for a hearing before the Commission. Not more than 24 hours after the conclusion of the hearing, the Commission shall affirm, modify, or set aside the secretary's order. An enforceable order, therefore, can be issued and affirmed within a reasonable time for emergency situations and, under such conditions, the requirement for service of notice of the hearing is not required. The order may then be enforced through injunctive procedures by the Attorney General upon the request of the Commission.[9] Kentucky's Law therefore, as originally adopted, provides adequate abatement procedures within an emergency or episode time frame requirement.

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[5] Kentucky Senate Bill No. 378, as amended, (1970).

[6] Kentucky Rev. Stat. §224.350.

[7] Kentucky APC Commission, Regulation No. 8.

[8] Kentucky Rev. Stat. §224.400.

[9] Kentucky Rev. Stat. §224.991.

Table 3-1. ANALYSIS OF KENTUCKY APC LAWS AND REGULATIONS AS OF JULY, 1970

Desirable or Essential Powers	Agency Possessing Specific Power	Statute Expressly Conferring Specific Power or Regulation Implementing General Conferral of Power
1. Definition of air pollution in State Law must be sufficiently broad to enable the agency to protect welfare and injury to property as well as health	APC Commission	KRS. §224.310 (C)
2. Under the definition of air pollution, the agency must be able to control and prevent conditions which threaten or endanger the public health or welfare before the occurence of actual injury	APC Commission	KRS. §224.310 (C)
3. Power to hold public hearings relating to any aspect of the administration of air pollution laws and regulations	APC Commission	KRS. §224.430 (2) Ky. APC Commission Regulation No. 6
4. Power to adopt, amend and repeal rules and regulations	APC Commission	KRS. §224.430(10),(11),&(12) Ky. APC Commission Regulation No. 9
5. Power to enforce the law by appropriate administrative and judicial proceedings, including injunctive relief	APC Commission	KRS. §224.991
6. Power to compel the attendance of witnesses at hearings and other administrative proceedings (subpoena power)	APC Commission	KRS. §224.430(2)

Table 3-1. (continued)

Desirable or Essential Powers	Agency Possessing Specific Power	Statute Expressly Conferring Specific Power or Regulation Implementing General Conferral of Power
7. Power to gain access to records relating to emissions of air contaminants	APC Commission	KRS. §§224.350, 224.360(2), and 224.430(4) Ky. APC Commission Regulations No. 1 and No. 8
8. Power to compel the production of books and records for use in administrative proceedings (subpoena power)	APC Commission	KRS. §224.430(2) Ky. APC Commission Regulations No. 6 (8) and (9)
9. Power to secure necessary technical information by contract or otherwise	APC Commission	KRS. §224.430(5)

Table 3-1. (continued)

Desirable or Essential Powers	Agency Possessing Specific Power	Statute Expressly Conferring Specific Power or Regulation Implementing General Conferral of Power
10. Power to prepare comprehensive plans for the control of air pollution	APC Commission	KRS. §224.430(6)
11. Power to collect and disseminate information concerning air pollution (including conduct of studies, investigations and research)	APC Commission	KRS. §224.430(7)
12. Power to establish ambient air quality standards and emission standards for all or parts of the State	APC Commission	KRS. §224.430(10)

Table 3-1. (continued)

Desirable or Essential Powers	Agency Possessing Specific Power	Statute Expressly Conferring Specific Power or Regulation Implementing General Conferral of Power
13. Power to classify air contaminant sources and require reports from such classes	APC Commission	KRS. §§224.350 and 224.360 Ky. APC Commission Regulations No. 1
14. Power to establish a permit system for the construction and operation of new sources and control apparatus as well as for the alteration of existing sources and control apparatus	APC Commission	KRS. §224.360 Ky. APC Commission Regulation No. 8
15. Power to inspect, subject to legal limitations regarding search warrants, the locations of contaminant sources	APC Commission	KRS. §224.370

Table 3-1. (continued)

Desirable or Essential Powers	Agency Possessing Specific Power	Statute Expressly Conferring Specific Power or Regulation Implementing General Conferral of Power
16. Power to conduct tests of emissions of air contaminants from any source	APC Commission	KRS. §224.370
17. Power to utilize variances subject to careful procedural and substantive controls	APC Commission	KRS. § 224.410
18. Power to provide for the confidentiality of information acquired from private sources, without unduly restricting ability to enforce the applicable law	APC Commission	KRS. §224.380

Table 3-1. (continued)

Desirable or Essential Powers	Agency Possessing Specific Power	Statute Expressly Conferring Specific Power or Regulatio Implementing General Conferral of Power
19. Power to exercise emergency authority to limit or eliminate emissions from stationary sources with minimum delay	APC Commission	KRS. §224.400
20. Power to impose penalties for air pollution violations	APC Commission	KRS. §224.991
21. Power to receive and administer grants or gifts made for the purpose of carrying out the statute and regulations	APC Commission	KRS. §224.430(9)

Table 3-1. (continued)

Desirable or Essential Powers	Agency Possessing Specific Power	Statute Expressly Conferring Specific Power or Regulation Implementing General Conferral of Power
22. Power to advise, consult, cooperate and enter into agreements with the governments and agencies of the adjacent States, and any interstate or regional agency representing any such State or political subdivision	APC Commission	KRS. §§224.430(8) and 65.210 et seq.
23. Power to take any action necessary to carry out statute and regulations	-	None
24. Power to delegate performance of duties to a subordinate agency	APC Commission	KRS. §224.450, Permits local APC programs with concurrent jurisdiction

The Kentucky APC Commission also has the authority to enter into an interstate agreement for the control of air pollution episodes through the Interlocal Cooperation Act.[10] A further discussion of Kentucky's role in episode avoidance activities is presented in Section 5.

3.8 ORGANIZATION OF REGIONAL ENFORCEMENT ACTIVITIES

The Kentucky APC Commission has jurisdiction throughout the entire state, and the existence of local programs does not vitiate the Commission's authority. An intrastate regional program may therefore be maintained by the State Commission, operating in the three-county area -- Campbell, Boone, and Kenton Counties.

The Kentucky APC Commission may participate in an interstate planning endeavor with the air pollution authorities of Indiana and Ohio through the authority of Kentucky's Interlocal Cooperation Act.

No legislative action was required for the proposed organization of regional operations within the Kentucky portion of the MCIAQCR.

3.9 INTERSTATE PLANNING AND SERVICES AUTHORITY

Interstate cooperation in the form of planning and computerized support services is a necessary element of the proposed regional structure. Services may be generally provided by contract with the City of Cincinnati and by contract with an interstate planning authority. Existing Ohio Law[11] permits any board of county commissioners and the legislative authority of any municipality to cooperate with other such entities in Ohio and in sister states to create by agreement an interstate regional planning commission. The various political subdivisions in Kentucky are empowered to enter such agreement pursuant to the authority given them by the state's Interlocal Cooperation Act.[12]

In light of an analysis of existing state laws applicable to MCIAQCR, it appears that the Regional Planning Commission will have adequate authority to conduct a program of information exchange and air pollution control planning and coordination. Ohio law, ORC §713.33(A) states that the "commission may make studies, maps, plans, and other reports relative to the region and shall recommend procedures and policies to the appropriate authorities, based on physical ... conditions and trends, to promote ... the general health, welfare, convenience, and prosperity of the people of the region." (Emphasis supplied.)

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[10] Kentucky Rev. Stat. §§65.210, et seq.
[11] Ohio Rev. Code §§713.30 et seq.
[12] Kentucky Rev. Stat. §§65.210 et seq.

3.10 SUMMARY OF LEGISLATIVE AND ADMINISTRATIVE ACTIONS NEEDED TO EFFECT THE IMPLEMENTATION PLAN

The preceding discussion pointed out the legal and administrative deficiencies which exist in the Kentucky Program, and the proposed remedial action. This is summarized in the following table.

TABLE 3-2.

SUMMARY OF LEGISLATIVE AND ADMINISTRATIVE ACTIONS TAKEN TO EFFECT THE IMPLEMENTATION PLAN FOR THE STATE OF KENTUCKY

Responsible Body	Effective Date	Purpose	Discussed on P. No.
Legislature	Mar. 16, 1970	Provide APC Commission with concurrent jurisdiction in those areas where a local APC program is in effect	3-4
Interstate Agreement	Aug. 1973	Interstate control of episodes	3-12

4. CONTROL REGULATIONS

4.1 EXISTING REGULATIONS

The current control regulations for the State of Kentucky are as follows:

REGULATION NO. 1

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: REGISTRATION OF AIR CONTAMINANTS AND AIR CONTAMINANT SOURCES

1. Persons engaged in the following classes of activities shall register operations or discharges which may result from such activities in accordance with the provisions of this regulation:

(1) Petroleum and Petro-Chemical Development, Processing and Marketing;

(2) Industrial Chemical Manufacturing and Processing (Excluding Petro-Chemical);

(3) Paints and Related Materials, Manufacturing and Handling;

(4) Plastic, Rubber and Resin Processing;

(5) Metal Melting and Reclaiming;

(6) Metal Fabricating;

(7) Surface Finishing and Coating;

(8) Mineral, Mining, Processing and Product Application, Including Refuse;

(9) Woodworking, Furniture Manufacturing, Sawmills, Including Refuse;

(10) Food Processing;

NOT REPRODUCIBLE

(11) Inedible Animal and Vegetable By-Product Processing;

(12) Hotels, Apartments and Office Buildings (Excluding Governmental);

(13) Commercial Activities;

(14) Governmental Agencies and Public Utilities;

(15) Vehicle Manufacturing and Servicing Facilities;

(16) Textile, Fabric, Fiber, Monofilament Manufacturing and Processing.

2. When the Commission determines that any operation by persons engaged in one or more of the classes of activities set forth in paragraph one may result in discharging air contaminants into the atmosphere persons so engaged shall be required to register and report on such operation or discharge. Following public notice pursuant to KRS Chapter 424 the Executive Secretary, shall carry out the Commission's determination by requiring the registration of any operation resulting in discharges set forth in KRS 224.310 (7) and which are " . . . smoke, dust, soot, grime, carbon, or any other particulate matter, radioactive matter, noxious acids, fumes, gases, odor, vapor, or any combination thereof; . . ." The Executive Secretary may require from such persons reports containing information relating to said air contaminants emitted by each into the atmosphere from said operations.

3. Registration and reporting of operations shall be upon forms provided by the Commission.

4. When any operation or combination of operations by persons engaged in one of the activities set forth in paragraph one has been designated for registration that person shall furnish the following information on forms provided by the Commission concerning that operation or operations for which such registration is required:

(1) Location of outlet

(2) Size of outlet

(3) Height of outlet

(4) Rate of discharge

(5) Time duration of discharge

(6) Composition of discharge

In addition to the foregoing information the Executive Secretary may require such other information as is reasonably necessary to evaluate such emissions as they relate to air pollution as it is defined in KRS 224.310 (6), and as to the effectiveness of such control methods or devices as may have been provided.

REGULATION NO. 2

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: Prohibition of Open Burning

1. PURPOSE

This regulation is adopted for the purpose of preventing, abating, and controlling air pollution caused by air contaminants discharged into the air by open burning of combustibles.

2. DEFINITIONS - As used in this regulation.

(1) Basic Sediment - Sedimentary material that accumulates in crude oil storage tanks and separators located at production sites;

(2) Farmstead - Farm buildings and their immediate surroundings excluding pastures, crops and woodlands;

(3) Flue - Any duct or passage for air, gases or the like, such as a stack or chimney;

(4) Garbage - Putrescible animal and vegetable matter accumulated by a family in a residence in the course of ordinary day to day living;

(5) Household Rubbish Waste material and trash, not to include garbage, normally accumulated by a family in a residence in the course of ordinary day to day living;

(6) Open Fire - The burning of any type of combustible material in the open not in any enclosure, where the products of combustion are emitted directly into the ambient air without being directed through a flue.

3. OPEN BURNING PROHIBITED

No person, firm, corporation, association, or public agency shall ignite, cause to be ignited, permit to be ignited, or suffer, allow, or maintain any open fire within the State of Kentucky after the effective date of this regulation, except as follows:

(1) Fires used only for cooking of food for human beings or for recreational purposes;

(2) Flare stacks for the combustion of waste gases;

(3) Fires set for disposal of basic sediment resulting from the production of crude oil;

(4) Fires set for prevention of a fire hazard, including the disposal of dangerous materials where no safe alternate is available;

(5) Fires set for the purpose of weed abatement, disease and pest prevention, disposal of natural growth for land clearing and trees and tree limbs felled by storms, provided prior approval is obtained from the fire department or fire district (where either exists) having jurisdiction at the place of burning;

(6) Fires set in connection with agricultural operations related to growing or harvesting of crops;

(7) Fires for disposal of household rubbish, not to include garbage, orginating at dwellings of five family units or less, which fires are maintained by occupant of the dwelling at the dwelling;

(8) Fires set for the purpose of bona fide instruction and training of public and industrial employees in the methods of fighting fires, provided notice is given in each instance to the Kentucky Air Pollution Control Commission five days in advance by the official in charge stating the following:

(a) The name, organization, address, and telephone number of the person submitting notice;

(b) The exact location where open burning will be used and the type and quantity of material to be burned;

(c) The scheduled date for burning. Should there be a postponement, the Kentucky Air Pollution Control Commission must be notified of the rescheduled date for burning before the burning shall take place;

(d) That such fire is necessary for bona fide instruction and training.

(9) Fires set for burning of leaves at farmsteads and dwellings, provided such fires are not prohibited by local ordinance.

4. City and county solid waste disposal operations shall not be subject to the provisions of this regulation until three months after the effective date of this regulation.

5. Nothing in this regulation is intended to permit any practice which is a violation of any statute, ordinance or regulation.

REGULATION NO. 3

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: Prevention, Abatement and Control of Air Contaminants From Incinerators

1. PURPOSE

This regulation is adopted for the purpose of preventing, abating, and controlling air pollution caused by air contaminants discharged into the atmosphere from incinerators, by establishing emission standards for all incinerators and minium construction standards for incinerators designed to burn, at rates of 1200 lbs. per hour or less, types 0, 1, 2, 3, and 4 waste.

2. MINIMUM CONSTRUCTION STANDARDS FOR INCINERATORS DESIGNED TO BURN TYPES 5 AND 6 WASTE AND OTHER INCINERATORS DESIGNED TO BURN IN EXCESS OF 1200 LBS. PER HOUR

Minimum construction standards for incinerators designed to burn type 5 or type 6 waste and other incinerators designed to burn in excess of 1200 lbs. per hour shall be established on an individual basis, however, all incinerators shall conform to the emission standards as set forth in this regulation.

3. EXCEPTED

Backyard waste burners having a capacity of two bushels (four cubic feet) or less are excepted from this regulation.

4. DEFINITIONS - As used in this regulation.

(1) Air Contaminant - Includes smoke, dust, soot, grime, carbon, or any other particulate matter, radioactive matter, noxious acids, fumes, gases, odor, vapor, or any combination thereof;

(2) Bridge Wall - A partition wall between chambers over which pass the products of combustion;

(3) Burner - A device for supplying ignition, flame, and auxiliary heat to materials of low heat values which may be required to maintain given temperatures in primary and secondary chambers;

(4) Burning Rate - The amount of waste incinerated per unit time expressed in pounds per hour;

(5) Curtain Wall - A partition wall between chambers which deflects the gas stream downward;

(6) Flue Gas - The products of combustion that leave the incinerator by way of a flue or stack;

(7) Fly Ash - Any solids carried in the gas stream being emitted from a flue or stack;

(8) Grate - A surface upon which materials to be disposed of are placed, which has openings for the passage of air necessary for combustion;

(9) Hearth - A solid surface upon which materials with a high moisture or liquid content may be placed for disposal by combustion;

(10) Heat Release - The amount of heat liberated by the complete combustion of a given unit of a specific material and expressed as B. T. U.'s per hour per cubic foot of the inside volume of the furnace in which the combustion takes place;

(11) Heating Values - The B. T. U.'s released by the combustion of a unit quantity of fuel or waste;

(12) Incinerator - An engineered apparatus capable of withstanding elevated temperatures and designed to efficiently reduce, by burning, solid, semi-solid, liquid or gaseous conbustible waste at specified rates and from which the residues contain little or no combustible materials;

(13) Particulate Matter - Any material, except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions;

(14) Spark Arrester - A device for screening sparks from burning materials in order to prevent discharge to the atmosphere;

(15) Stack - Any duct, passage, chimney or flue for carrying combustion gases or products of combustion to the atmosphere.

5. CLASSIFICATION OF WASTES

TYPE 0

Trash, a mixture of highly combustible waste such as paper, cardboard cartons, wood boxes, and combustible floor sweepings, from commercial and industrial activities. The mixtures contain up to 10% by weight of plastic bags, coated paper, laminated paper, treated corrugated cardboard, oily rags, and plastic or rubber scraps.

This type of waste contains 10% moisture, 5% incombustible solids and has a heating value of 8500 B. T. U.'s per pound as fired.

TYPE 1

Rubbish, a mixture of combustible waste such as paper, cardboard cartons, wood scrap, foliage and combustible floor sweepings, from domestic, commercial and industrial activities. The mixture contains up to 20% by weight of restaurant or cafeteria waste, but contains little or no treated papers, plastic or rubber wastes.

This type of waste contains 25% moisture, 10% incombustible solids and has a heating value of 6500 B. T. U.'s per pound as fired.

TYPE 2

Refuse, consisting of an approximately even mixture of rubbish and garbage by weight.

This type of waste is common to apartment and residential occupancy, consisting of up to 50% moisture, 7% incombustible solids, and has a heating value of 4300 B. T. U.'s per pound as fired.

TYPE 3

Garbage, consisting of animal and vegetable wastes from restaurants, cafeterias, hotels, hospitals, markets and like installations.

This type of waste contains up to 70% moisture, up to 5% incombustible solids, and has a heating value of 2500 B. T. U.'s per pound as fired.

TYPE 4

Human and animal remains, consisting of carcasses, organs and solid organic wastes from hospitals, laboratories, abattoirs, animal pounds and similar sources, consisting of up to 85% moisture, 5% incombustible solids, and having a heating value of 1000 B. T. U.' s per pound as fired.

TYPE 5

By-product waste, gaseous, liquid, or semi-liquid, such as tar, paints, solvents, sludge, fumes, etc., from industrial operations. B. T. U. values must be determined by the individual materials to be destroyed.

TYPE 6

Solid by-product waste, such as rubber, plastics, wood waste, etc., from industrial operations. B. T. U. values must be determined by the individual materials to be destroyed.

6. INCINERATOR CONSTRUCTION PROHIBITED WITHOUT PRIOR APPROVAL

The construction, reconstruction, installation, or substantial alteration of incinerators is prohibited unless plans and specifications therefor have been submitted to and approved by the Kentucky Air Pollution Control Commission.

7. EMISSION STANDARDS FOR NEW INCINERATORS

Incinerators constructed, reconstructed, installed, or substantially altered after the effective date of this regulation shall conform to the following emission standards:

(1) There shall not be discharged in the atmosphere from any incinerator any air contaminant for a period or periods aggregating more than three minutes in any one hour which is:

(a) as dark or darker in shade as that designated as No. 2 on the Ringelmann Chart as published by the United States Bureau of Mines; or

(b) of such opacity, (excluding water vapor) as to obscure an observers view to a degree equal to or greater than air contaminants described in subsection (a) of this section.

(2) Particulate matter emitted shall not exceed 0.40 lbs. per 1000 lbs. of gases based upon total products of combustion and adjusted to 50% excess air.

8. EXISTING INCINERATORS SHALL COMPLY WITH EMISSION STANDARDS WITHIN ONE YEAR

One year from the effective date of this regulation all existing incinerators shall conform to the emission standards set forth in Section 7 of this regulation.

9. INCINERATOR MANUFACTURER'S NAME PLATE

The manufacturer's name plate shall be installed in a conspicuous place on the incinerator giving model number, rate capacity, and the types of waste fuel for which the unit is designed.

10. POSTING OF INSTRUCTIONS FOR OPERATION OF INCINERATORS

Detailed instructions for the operation of each incinerator shall be posted in a conspicuous place near the incinerator.

11. MANUFACTURERS SHALL INSTRUCT OPERATORS

The manufacturer of an incinerator shall instruct an operator, designated by the owner, in the proper operation and care of each unit constructed.

12. TRAINED AND COMPETENT OPERATOR REQUIRED

The owner is responsible for having an operator trained and competent in the operation of the incinerator in charge of the incinerator.

13. MINIMUM CONSTRUCTION STANDARDS FOR INCINERATORS DESIGNED TO BURN TYPES 0, 1, 2, 3, AND 4 WASTE AT RATES OF 1200 LBS. PER HOUR OR LESS

(1) Incinerators designed to burn types 0, 1, 2, 3, and 4 waste at rates of 1200 lbs.

per hour or less constructed after the effective date of this regulation shall contain the following components:

(a) Primary burning chamber
(b) Grates or hearth
(c) Ash pit
(d) Mixing or down pass area
(e) Settling chamber, or scrubber, or afterburner (any one or combination thereof)

(2) Incinerators shall be designed in such a manner that the B. T. U. release for the entire incinerator will not exceed 25,000 B. T. U. per cubic foot per hour.

(3) The secondary chamber shall be constructed to equal or exceed in size 125% of the volume of the primary chamber (exclusive of ash pit) and designed so that gases will not exceed 9 feet per second at some point within the secondary chamber where travel distance is equal to the square root of the cross section at that point.

(4) The down pass shall be constructed in such a manner that the gases passing through this area will not exceed 32 feet per second. Adjustable air ports shall be provided in the down pass area for the introduction of fresh secondary air into the gas stream to aid in combustion of unburned gases.

(5) Roof or arch height above grate level will be a minimum of one-half the width of the primary chamber plus one-half the length of the primary chamber.

Example:

Roof height = ½ (Width + lenght of primary chamber)
Primary chamber 4' in length (inside measurement)
Primary chamber 2' in width (inside measurement)
4' + 2' = 6' 6' ÷ 2' = 3' height of roof or roof arch above grates.

(6) Stacks shall conform to the following:

(a) Height and cross sectional area of stacks shall be sufficient to provide adequate draft for the unit. This should be at least 0.1 inches water column negative pressure in the primary chamber with burners operating.

(b) The top of the stack must be at least five feet above (1) the building to which it is attached and (2) any obstacle within 25 feet.

(c) Stacks shall be lined with a material capable of withstanding anticipated operating temperatures, but not less than 1,500° F.

(d) In no case shall a flue be used as a means of direct charging of an incinerat

(e) Stacks not standing directly on top of an incinerator shall have a clean-out door at or near the bottom.

(f) All stacks shall equal or exceed the requirements for construction and installation of the National Board of Fire Underwriters Pamphlet No. 82.

(g) A seperate flue (stack) shall be constructed for incinerators to be installed in new buildings.

(h) The flue pipes and breechings connecting the incinerator to the stack shall be constructed of not lighter than eleven gauge steel plate. Where the cross section area is less than 202 square inches, the flue pipes and breechings shall be lined with not less than 2" of high-grade refractory material that will withstand 1,500° F. Where the cross section area of the flue pipes and breechings is 202 square inches or more the lining shall not be less than 3" of high-grade refractory material that will withstand 1,500° F.

(i) Stacks shall be equipped with spark arrestors which are no less than two stack diameters in height and have screen openings no larger than ½" by ½".

(7) Incinerators shall be constructed so as to meet the following requirements for draft:

(a) Stack draft between 0.2 and 0.35 inches water column.
(b) Primary draft between 0.1 and 0.2 inches water column measured at the inlet.

(8) Combustion air shall be introduced into incinerators in the following proportions:

(a) Over fire air - 70% of total air required.
(b) Under fire air - 10% of total air required.
(c) Secondary air - 20% of total air required.
(d) Secondary air must be introduced into the mixing chamber.

(9) Incinerators designed to burn materials with a B. T. U. rating of less than 6,500 B. T. U.'s per pound shall be equipped with an auxiliary burner capable of maintaining 1,000° F in the primary chamber and 1,400° F in the secondary chamber.

(10) Units up to and including 700 pounds per hour capacity shall be of the retort type.

(11) In-line units may be used for incinerators with capacity above 700 lbs.

14. MINIMUM CONSTRUCTION STANDARDS FOR METAL CLAD UNITS DESIGNED TO BURN TYPES 0, 1, 2, 3, AND 4 WASTE AT RATES OF 1200 LBS. PER HOUR OR LESS IN ADDITION TO MINIMUM CONSTRUCTION STANDARDS SET FORTH IN SECTION 13

Metal clad incinerators designed to burn types 0, 1, 2, 3, and 4 waste at rates of 1200 lbs. per hour or less shall be constructed in the following manner:

(1) The shell must be constructed of not less than eleven gauge steel plate with exposed seams continuously welded. Seams not exposed shall be continuously welded, or skip welded, or have bolted flanges, or any combination thereof.

(2) The shell must be sufficiently braced to withstand the thrust of heat expansion.

(3) There must be one inch of high temperature insulation between the shell and refractory lining on units with capacity of 200 pounds or less per hour, and two inches or more of such insulation on units with capacity in excess of 200 pounds per hour.

(4) The refractory wall must be adequately tied to the outside shell.

(5) The roof slab or roof arch must be adequately suspended or supported.

15. MINIMUM CONSTRUCTION STANDARDS FOR MASONRY UNITS DESIGNED TO BURN TYPES 0, 1, 2, 3, AND 4 WASTE AT RATES OF 1200 LBS. PER HOUR OR LESS IN ADDITION TO MINIMUM CONSTRUCTION STANDARDS SET FORTH IN SECTION 13

(1) The refractory walls and the outside masonry walls must be securely tied to each other. For purposes of insulation, an air space may be utilized between the two walls in lieu of installation of insulation material.

(2) Masonry stacks shall have a refractory lining.

16. INCINERATION

Waste will be incinerated in the following manner:

(1) Types 0, 1, and 2 waste will be incinerated on grates.
(2) Type 3 waste will be incinerated on combination drying hearth and grates.
(3) Type 4 waste will be incinerated on a hot hearth.
(4) Types 5 and 6 waste incineration will be given special consideration on individual installation basis.
(5) Grate area shall be computed on a horizontal projected area and not on the line of slope or area of individual step grates.
(6) Burning rate per square foot of grate area must equal the factor for type of waste to be burned multiplied by the log of capacity per hour.

Types 0 and 1 waste factor is 12.
Type 2 waste factor is 10.
Type 3 waste factor is 8.

Log for 100 lbs. per hour = 2.00
Log for 200 lbs. per hour = 2.30
Log for 300 lbs. per hour = 2.48
Log for 400 lbs. per hour = 2.60
Log for 500 lbs. per hour = 2.70
Log for 600 lbs. per hour = 2.78
Log for 700 lbs. per hour = 2.85
Log for 800 lbs. per hour = 2.90
Log for 900 lbs. per hour = 2.95
Log for 1,000 lbs. per hour = 3.00
Log for 1,100 lbs. per hour = 3.20
Log for 1,200 lbs. per hour = 3.40

Burning rates for incineration above 1,200 lbs. per hour shall be established on an individual basis.

Example Of Method Used To Compute Burning Rate

Assume:

(1) Capacity of 200 pounds per hour, which has log of 2.30.

(2) Type 2 waste, which has a factor of 10.
Burning rate per square foot of grate area = 10 X 2.30 = 23 pounds per square foot of grate area per hour.

(7) The burning rate for Type 4 waste is a constant 10 pounds per square foot of hearth.

17. NEW DESIGN AND ENGINEERING FEATURES

Nothing in this Regulation shall be interpreted as prohibiting the Kentucky Air Pollution Control Commission from approving the construction of any incinerator which will introduce:

(a) New methods which may improve upon combustion and reduce air pollution.

(b) New design and engineering features which may improve upon combustion and reduce air pollution.

18. Nothing in this Regulation is intended to permit any practice which is a violation of any statute, ordinance, or regulation.

REGULATION NO. 4

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: Prevention, Abatement and Control of Air Contaminants From Waste Burners

1. PURPOSE

This regulation is adopted for the purpose of preventing, abating, and controlling air pollution caused by air contaminants discharged into the air from waste burners.

2. EXCEPTED

Backyard waste burners having a capacity of two bushels (four cubic feet) or less are excepted from this regulation.

3. DEFINITIONS - as used in this regulation.

(1) Air Contaminant - Includes smoke, dust, soot, grime, carbon, or any other particulate matter, radioactive matter, noxious acids, fumes, gases, odor, vapor, or any combination thereof;

(2) Incinerator - An engineered apparatus capable of withstanding elevated temperatures and designed to efficiently reduce, by burning, solid, semi-solid, or gaseous combustible waste at specified rates and from which the residues contain little or no combustible material;

(3) Particulate Matter - Any material, except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions;

(4) Waste Burner - Any article, machine, equipment, contrivance or device, including, but not limited to, burners commonly known as tepees, wigwams, truncated cones, and silos, which is not an incinerator as defined in this regulation, used to dispose of combustible refuse by burning.

4. WASTE BURNER CONSTRUCTION PROHIBITED WITHOUT PRIOR APPROVAL

Construction, reconstruction or substantial alteration of waste burners is prohibited after the effective date of this regulation, unless plans and specifications have been submitted to and approved by the Kentucky Air Pollution Control Commission.

5. EMISSION STANDARDS

Waste burners constructed, reconstructed or substantially altered after the effective date of this regulation shall conform to the following emission standards:

(1) There shall not be discharged into the atmosphere from any waste burner, any air contaminant for a period or periods aggregating more than three minutes in any one hour which is (a) as dark or darker in shade as that designated as No. 2 of the Ringelmann Chart as published by the United States Bureau of Mines; or (b) of such opacity (excluding water vapor) as to obscure an observers view to a degree equal to or greater than air contaminants described in subsection (a) of this section;

(2) Particulate matter shall not be discharged into the atmosphere from any waste burner which exceeds 0.40 lbs. per 1,000 lbs. of gases based upon total products produced by combustion and adjusted to 50% excess air.

6. EXISTING WASTE BURNERS MUST COMPLY WITH EMISSION STANDARDS WITHIN ONE YEAR

One year from the effective date of this regulation all waste burners shall meet the emission standards set forth in Section 5 of this regulation.

7. WASTE BURNER MANUFACTURER'S NAME PLATE

The manufacturer's name plate shall be installed in a conspicuous place on the waste burner giving model number, rate capacity and the type of waste fuel for which the unit is designed.

8. POSTING OF INSTRUCTIONS FOR OPERATION

Detailed instructions for the operation of each waste burner shall be posted in a conspicous place near the waste burner.

9. MANUFACTURERS SHALL INSTRUCT OPERATORS

The manufacturer of a waste burner shall instruct an operator, designated by the owner, in the proper operation and care of each unit constructed.

10. TRAINED AND COMPETENT OPERATOR REQUIRED

The owner is responsible for having an operator trained and competent in the operation of a waste burner in charge of the waste burner.

11. Nothing in this regulation is intended to permit any practice which is a violation of any statute, ordinance or regulation.

REGULATION NO. 5

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: Prevention, Abatement and Control of Air Contaminants From Coal Refuse Disposal Areas

1. PURPOSE

This regulation is adopted for the purpose of preventing, abating, and controlling air pollution caused by air contaminants discharged from burning coal refuse piles.

2. DEFINITIONS - As used in this regulation.

(1) Coal Refuse - Any waste coal, rock, shale, culm, boney, slate, clay and related materials, associated with or near a coal seam, which are either brought above ground or otherwise removed from the mine in the process of mining coal, or which are separated from coal during the cleaning or preparation operations, provided, however, that coal refuse shall not mean overburden from strip mining operations or rock from mine shafts and mine tunnels;

(2) Coal Refuse Pile - Any deposit of coal refuse on or buried in the earth and intended as permanent disposal of or long-term storage of such material. Continuous deposits of coal refuse and deposits not separated by an approved method shall be considered as a single coal refuse pile;

(3) Coal Refuse Disposal Area - Any area or plot of land used as a place for dumping, storage, or disposal of coal refuse. A coal refuse pile must be contained in a single coal refuse disposal area; however, a coal refuse disposal area may contain two or more coal refuse piles if the area is so designated;

(4) Commission - Means the Kentucky Air Pollution Control Commission;

(5) Operation - To enter upon a coal refuse disposal area for the purpose of disposing, depositing, or dumping coal refuse or otherwise physically altering the coal refuse disposal area.

3. OPERATION OF NEW COAL REFUSE DISPOSAL AREAS PROHIBITED WITHOUT PRIOR APPROVAL

The operation of a coal refuse disposal area, not used for the purpose of coal refuse disposal prior to the effective date of this regulation, is prohibited unless the procedures for disposal have been submitted to and approved by the commission prior to disposal. Application is to be made on forms provided by the Commission.

4. OPERATION OF EXISTING COAL REFUSE DISPOSAL AREAS PROHIBITED WITHOUT APPROVAL

Within ninety (90) days after (a) the effective date of this regulation or (b) the application forms become available, whichever is later, or within such additional period as the Commission may authorize, any person, firm, corporation or association who desires to continue the operation of an existing coal refuse disposal area shall make application to the Commission, on forms provided by it, for approval to continue operation of such area. The operation of an existing coal refuse disposal area may continue while the application is under consideration by the Commission and thereafter unless disapproved by the Commission.

5. PRODEDURES FOR OPERATION OF COAL REFUSE DISPOSAL AREAS

The procedures outlined in this section will be used as a basis for approval of coal refuse disposal areas:

(1) Coal refuse is not to be deposited on any coal refuse disposal area unless the coal refuse is deposited in such a manner as to minimize the possibility of ignition of the coal refuse;

(2) Coal refuse disposal areas shall not be so located with respect to mine openings, tipples, or other mine buildings, unprotected coal outcrops or steam lines, that these external factors will contribute to the ignition of the coal refuse on such coal refuse disposal areas;

(3) Vegetation and combustible materials shall not be left on the ground at the si where a coal refuse pile is to be established, unless it is rendered inert before coal refuse is deposited on such site;

(4) Coal refuse shall not be dumped or deposited on a coal refuse pile known to be burning;

(5) Material with low ignition points used in the production or preparation of coal, including but not limited to wood, brattice cloth, waste paper, rags, oil and grease, shall not be deposited on any coal refuse disposal area or in such proximity as will reasonably contribute to the ingnition of a coal refuse disposal area;

(6) The site of the coal refuse disposal area is to be such that water run off from the adjacent area will not drain into the coal refuse;

(7) Coal refuse is to be deposited in such manner that it will not slide or shift so as to enhance the possibility of ignition;

(8) Garbage, trash, household refuse, and like materials shall not be deposited on or near any coal refuse disposal area.

6. DELIBERATE IGNITION OF A COAL REFUSE DISPOSAL AREA IS PROHIBITED

The deliberate ignition of a coal refuse disposal area or the ignition of any materials on such an area by any person or persons is prohibited.

7. BURNING COAL REFUSE DISPOSAL AREAS

(1) Each coal refuse disposal area which causes air pollution will be considered on an individual basis by the Commission. After considering the established facts and circumstances of the particular case, the Commission will determine and may order the effectuation of those air pollution control measures which the Commission deems reasonalby adequate for each such coal refuse disposal area;

(2) With respect to all other burning coal refuse disposal areas, the person responsible for such coal refuse disposal areas or the land on which such coal refuse disposal areas are located shall use due diligence to control air pollution from such coal refuse disposal areas. The Commission shall determine what constitutes due diligence;

(3) When the Commission determines that air pollution exists or may be created, the person responsible for such coal refuse disposal area or the land owner on which such coal refuse disposal area is located shall submit to the Commission a satisfactory program setting forth methods and procedures to eliminate, prevent, or reduce such air pollution. This program shall be submitted within thirty (30) days after notification and shall contain sufficient information to establish that such program can be executed with due diligence.

8. Nothing in this regulation is intended to permit any practice which is a violation of any statute, ordinance or regulation.

REGULATION NO. 7

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: Prevention and Control of Emissions of Particulate Matter from Combustion of Fuel in Indirect Heat Exchangers

1. PURPOSE

This regulation is adopted for the purpose of preventing, abating and controlling air pollution caused by particulate matter emitted into the atmosphere from fuel-burning indirect heat exchangers.

2. EXEMPTION

Indirect heat exchangers used solely for heating residential buildings not exceeding a total of six apartment units are exempt from this regulation.

3. DEFINITIONS

As used in this regulation, unless the context clearly indicates otherwise, the following words shall have the following meaning:

(1) "Person" means any individual, public or private corporation, political subdivision, governmental agency, municipality, industry, co-partnership, association, firm, trust, estate, or other entity whatsoever;

(2) "Particulate Matter" means any material, except uncombined water which exists in a finely divided form as a liquid or solid at standard conditions;

(3) "Standard Conditions" are 60°F, 14.7 psia;

(4) "Indirect heat exchanger" means any piece of equipment, apparatus or contrivance used for the combustion of fuel in which the energy produced is transferred to its points of usage through a medium that does not come in contact with or add to the products of combustion;

(5) "New installations" means indirect heat exchangers, the construction of which is begun after the effective date of this regulation;

(6) "Existing installations" means indirect heat exchangers installed or under construction prior to the effective date of this regulation.

4. EMISSIONS OF PARTICULATE MATTER PROHIBITED

(1) No person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any new installations of indirect heat exchangers which is as dark or darker in shade than that designated as No. 2 on the Ringelmann Smoke Chart as published and described by the U.S. Bureau of Mines Bulletin 8333, hereinafter referred to as the Ringelmann Smoke Chart; or of such opacity as to obscure an observer's view to a degree equal to or greater than does particulate matter described in section 4 (1) of this regulation.

(2) No person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any existing installations of indirect heat exchangers which is darker in shade than that designated as No. 2 on the Ringelmann Smoke Chart; or of such opacity as to obscure an observer's view to a degree equal to or greater than does particulate matter described in section 4 (2) of this regulation.

(3) The provisions of subsections 4 (1) and 4 (2) shall not apply to:

(a) Emissions into the open air of particulate matter from any indirect heat exchanger during building a new fire, cleaning the firebox, or blowing soot, for a period or periods aggregating not more than six minutes in any sixty minutes which is a shade equal to but not darker than that designated as No. 3 on the Ringelmann Smoke Chart or of such opacity as to obscure an observer's view to a degree equal to or greater than does particulate matter described in this subsection.

(b) During emergency conditions caused by an unavoidable breakdown, and for a period of time, as determined by the staff, provided the Commission is notified promptly.

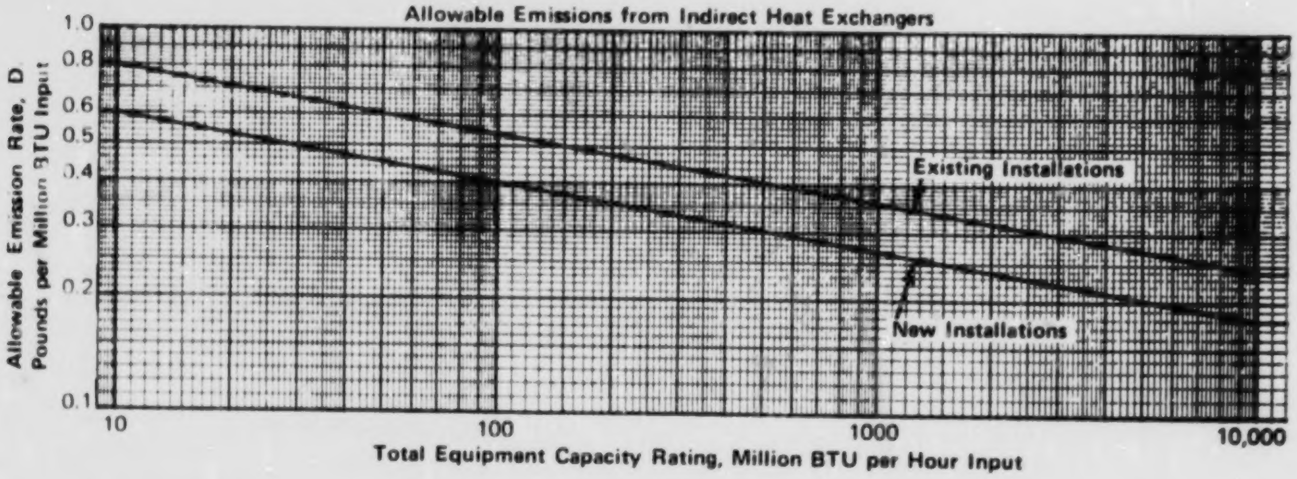
(c) Emissions from each waterwall indirect heat exchanger during start-up operations.

(4) No person shall cause, suffer, allow or permit the emission of particulate matter from indirect heat exchangers if the particulate matter emitted as measured in the flue exceeds the following weights: In indirect heat exchangers in which the preponderance of the particulate matter emitted is caused by the burning of fuel, 0.80 pounds for existing installations and 0.60 pounds for new installations for each million BTU per hour input if the indirect heat exchangers has a capacity rating of 10 million or less. If the capacity rating of the indirect heat exchanger is more than 10 million, the amount of particulate matter which may be emitted for each million BTU input shall decrease as the capacity rating of the indirect heat exchanger increases as listed in Table 1 and illustrated in Figure 1 incorporated as a part of this regulation.

TABLE I
MAXIMUM EMISSION RATES – POUNDS PER MILLION BTU INPUT

1 M M BTU/Hour Heat Input	2 Existing Installations	3 New Installations
10 or less	0.8	0.6
50	0.61	0.46
100	0.53	0.40
500	0.40	0.30
1,000	0.35	0.26
2,500	0.31	0.23
5,000	0.27	0.20
7,500	0.25	0.19
10,000 or more	0.24	0.18

The amount of particulate matter which may be emitted from indirect heat exchangers having an intermediate capacity rating shall be determined by linear interpolation. For any given indirect heat exchanger air contaminant source the combined total capacity rating of all fuel burning units in that air contaminant source shall determine the amount of allowable particulate emission.


Allowable Emissions from Indirect Heat Exchangers

5. NOTIFICATION OF PLANNED SHUTDOWN

Upon request by the Kentucky Air Pollution Control Commission, any person operating an indirect heat exchanger shall furnish the Commission with at least ten (10) days notice of planned shutdown of the equipment.

6. PERMITS

No person shall install or construct new equipment or new devices intended to eliminate, reduce, or control the emission of particulate matter from indirect heat exchangers without first obtaining from the Kentucky Air Pollution Control Commission a permit for such installation or construction. The obtaining of a permit shall not relieve any person from compliance with the emission standards of this Regulation or any other applicable regulations. The provisions of this section shall not apply to the following:

(1) New installations with a capacity of less than 1 million BTU per hour input;

(2) New installations using natural or liquified petroleum gas exclusively with a capacity of less than 50 million BTU per hour input;

(3) New mobile internal combustion and jet engines, marine installations and locomotives.

7. TESTING AND SAMPLING

(1) Whenever the Kentucky Air Pollution Control Commission has reason to believe that the emission limits of this Regulation are being violated, it may require the owner to conduct or have conducted at the owner's expense, tests to determine the particulate matter emission level, which tests shall include stack tests if circumstances so demand. The Kentucky Air Pollution Control Commission may request that such tests be conducted in the presence of Commission representatives.

(2) Should the Kentucky Air Pollution Control Commission wish to conduct tests of its own to determine compliance with emission limits of this Regulation, the owner shall provide at no expense to the Kentucky Air Pollution Control Commission, reasonable and necessary openings in stacks, vents, and ducts, along with safe and easy access thereto including a suitable power source to the point of testing.

(3) The Kentucky Air Pollution Control Commission shall be supplied with such data as it may require to establish test conditions.

(4) Stack tests for particulate matter shall be made by methods found in ASME "Power Test Code PTC 27," dated 1957, titled, "Test Code for Determining Dust Concentration in Gas Streams" or by such other methods approved by the Kentucky Air Pollution Control Commission.

8. COMPLIANCE WITH EMISSION LIMITATIONS BY EXISTING INSTALLATIONS

Emission of particulate matter from existing indirect heat exchangers shall comply with this Regulation within eighteen months after the effective date of this Regulation unless a program of compliance requiring additional time has been approved by the Commission pursuant to the provisions of KRS 224.410.

9. Nothing in this Regulation is intended to permit any practice which is in violation of any statute, ordinance or regulation.

REGULATION NO. 8

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: Permit to Construct and Operate an Air Contaminant Source

1. As used in this regulation, unless the context clearly indicates otherwise, the following words shall have the following meaning:

(1) "Person" or "Persons" means any individual, public or private corporation, political subdivision, government agency, municipality, industry, co-partnership, association, firm, trust, estate, or other entity whatsoever;

(2) 'Commission" means the Kentucky Air Pollution Control Commission;

(3) "Air contaminant" includes smoke, dust, soot, grime, carbon, or any other particulate matter, radioactive matter, noxious acids, fumes, gases, odor, vapor, or any combination thereof:

(4) "Air contaminant source" is any and all sources of emission of air contaminants, whether privately or publicly owned or operated. Without limiting the generality of the foregoing, this term includes all types of business, commercial and industrial plants, works, shops, and stores, and heating and power plants and stations, buildings and other structures of all types, including single and multiple family residences, apartments, houses, office buildings, public buildings, hotels, restaurants, schools, hospitals, churches, and other institutional buildings, automobiles, trucks, tractors, buses and other motor vehicles, garages and vending and service locations and stations, railroad locomotives, ships, boats and other waterborne craft, portable fuel-burning equipment, incinerators of all types, indoor and outdoor, refuse dumps and piles, and all stack and other chimney outlets from any of the foregoing (See Section 9 for Exemptions);

(5) "Air pollution" is presence in the outdoor atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as is or threatens to be injurious to human, plant or animal life, or to property, or which unreasonably interfere with the comfortable enjoyment of life or property.

(6) "Ambient air standard" means those standards for ambient air quality prescribed by regulation adopted by the Commission.

(7) "Emission standard" means those standards for emission into the atmosphere prescribed by regulation adopted by the Commission.

2. On and after July 1, 1970, no person shall construct, alter, use, operate, or maintain an air contaminant source or maintain or allow physical conditions to exist on property owned by or subject to the control of such person, resulting in the presence of air contaminants in the atmosphere, unless a permit therefor has been issued by the Commission and is currently in effect.

3. (1) Applications for permits required under Section 2 hereof shall be made on forms prepared by the Commission for such purpose and shall contain such information as the Commission shall deem necessary to determine whether the permit should be issued.

   (2) Such information shall, when specifically required by the Commission, include an analysis of the characteristics, properties, and volume of the air contaminants based upon source or stack samples of the air contaminants taken under normal operating conditions. Failure to supply information required or deemed necessary by the Commission to enable it to act upon the permit application shall result in denial of the permit.

   (3) An application for a permit may include one or more air contaminant sources provided that all of such air contaminant sources are contained within one facility. A permittee may apply for an amended permit to include new air contaminant sources provided that such new air contaminant sources are contained within the same facility.

4. The Commission shall take action upon applications for permits within not less than 30 days nor more than 60 days of the filing of the application with the Commission.

   In considering permit applications, the Commission shall determine if emission standards or ambient air standards are met. In cases where no standards have been prescribed by regulation the Commission shall require the use of all available, practical and reasonable methods to prevent and control air pollution.

5. Notwithstanding the provisions of Section 4 hereof, the Commission shall not deny any application for permit without, prior thereto, affording the applicant an opportunity for a hearing. Additionally, in the event any person or persons alleging themselves under oath to be presently affected adversely by the air contaminant source or physical conditions maintained, the Commission shall afford such persons a hearing to determine whether the permit should be issued or denied. Based upon the evidence presented at the hearing the Commission shall make its determination on sustaining or revoking the permit.

6. Permits issued hereunder shall be subject to such terms and conditions set forth and embodied in the permit as the Commission shall deem necessary to insure compliance with its standards. Such terms and conditions may include maintenance and availability of records relating to operations which may cause or contribute to air pollution including periodic source or stack sampling of the air contaminant sources.

   Acceptance of a permit conditioned as described herein shall denote agreement to the restrictions embodied in the permit and shall thenceforth be binding upon the holder of the permit.

7. Permits issued hereunder shall be subject to revocation or modification by the Commission, pursuant to the provisions of KRS 224.390, for the following causes:

(1) Failure to comply with the terms and conditions of the permit;

(2) Failure to comply with emission standards applicable to the air contaminant source;

(3) Failure to comply with the ambient air standards for the area in which the air contaminant source is located.

8. The Commission may require such applications for permit as it deems necessary to provide alternative operational or control plans designed to bring about an immediate reduction of air contaminant emissions on an interim basis to prevent or alleviate the effects of air pollution episodes resulting from periods of atmospheric stagnation. Such air pollution episode plans as are submitted and approved hereunder shall become terms and conditions of the permit issued pursuant to the application and shall have full force and effect as a part thereof.

9. This regulation shall not apply to the following:

(1) Those air contaminant sources set forth in AP-2, paragraph 3 (1, 4, 5, 6, 7, 8, 9) which read:

"(1) Fires used only for cooking of food for human beings or for recreational purposes;

(4) Fires set for prevention of a fire hazard, including the disposal of dangerous materials where no safe alternate is available;

(5) Fires set for the purpose of weed abatement, disease and pest prevention, disposal of natural growth for land clearing and trees and tree limbs felled by storms, provided prior approval is obtained from the fire department or fire district (where either exists) having jurisdiction at the place of burning;

(6) Fires set in connection with agricultural operations related to growing or harvesting of crops;

(7) Fires for disposal of household rubbish, not to include garbage, originating at dwellings of five family units or less, which fires are maintained by occupant of the dwelling at the dwelling;

(8) Fires set for the purpose of bona fide instruction and training of public and industrial employees in the methods of fighting fires, provided notice is given in each instance to the Kentucky Air Pollution Control Commission five days in advance by the official in charge stating the following:

(a) The name, organization, address, and telephone number of the person submitting notice;

(b) The exact location where open burning will be used and the type and quantity of material to be burned;

(c) The scheduled date for burning. Should there be a postponement, the Kentucky Air Pollution Control Commission must be notified of the rescheduled date for burning before the burning shall take place;

(d) That such fire is necessary for bona fide instruction and training.

(9) Fires set for burning of leaves at farmsteads and dwellings, provided such fires are not prohibited by local ordinance."

(2) Those air contaminant sources set forth in AP-3, paragraph 3, and AP-4, paragraph 2, which read identically:

"Backyard waste burners have a capacity of two bushels (four cubic feet) or less are excepted from this regulation."

(3) Indirect heat exchangers used solely for heating residential buildings not exceeding a total of six apartment units;

(4) Comfort ventilating systems;

(5) Internal combustion engines whether fixed or mobile, and vehicles used for transport of passengers or freight except as may be provided for in subsequent regulations.

10. This regulation shall be construed as complementary to such other regulations as have been adopted or shall be adopted by the Commission and the issuance of a permit hereunder is not intended to permit any practice which is in violation of any statute, ordinance or other regulation adopted by the Commission.

APCC - 9

Re: **AMBIENT AIR QUALITY STANDARDS**

Relates to KRS 224.340

Pursuant to the authority vested in the Kentucky Air Pollution Control Commission by KRS 224.340, the following regulation is adopted:

1. PURPOSE

The purpose of this regulation is to establish minimum acceptable standards of ambient air quality to protect the health and welfare of Kentucky citizens, enhance the quality of the Commonwealth's air resource, and prevent insofar as possible, deleterious effects to animals, plants and property.

2. DEFINITIONS

(1) Ambient Air Quality Standard - The numerical expression of a goal to be achieved in a stated time through the application of appropriate preventive and/or control measures. It consists of two parts - a specified concentration level for a particular air contaminant and the time-averaging interval over which that concentration level is measured.

(2) Standard Conditions - For the purpose of this regulation, all measurements and calculations shall be referenced to a temperature of 25 degrees centigrade and a barometric pressure of 760 millimeters of mercury.

(3) Dilution - The number of volumes of odorless air that must be added to a like volume of odor-bearing air to reduce the odor of the resulting mixture to just below the threshold level.

(4) Odor - The property of an air contaminant that affects the sense of smell.

(5) Maximum Average - An air contaminant concentration which shall not be exceeded more than once per year.

3. AMBIENT AIR QUALITY STANDARDS

In the establishment of these air quality standards, it is the intention of the Commission to prohibit further significant and avoidable deterioration of air quality in areas where air quality presently exists which is numerically equal to or less than the standards expressed herein.

The following air contaminant concentrations shall apply at any single point location:

(1) Particulate Matter	
(a) Suspended Particulates	
Annual Geometric Mean, not to exceed	65 µg/M^3
Twenty-Four Hour Average, not to be exceeded more than 1% of the days in any year	180 µg/M^3
Maximum Twenty-Four Hour Average	220 µg/M^3
(b) Settleable Particulates (Dustfall)	
(Measured as total water solubles and insolubles)	
Three-Month Average not to exceed	15 tons/sq.mile/mo. (5.25 gm/sq.meter/mo.)
(c) Soiling Index	
Annual Geometric Mean not to be exceeded	0.4 COH/1000 linear feet
Three-Month Average not to exceed	0.5 COH/1000 linear feet
(2) Sulfur Dioxide	
Annual Geometric Mean not to exceed	0.02 ppm (52 µg/M^3)
Maximum One-Month Average	0.05 ppm (131 µg/M^3)
Maximum Twenty-Four Hour Average	0.1 ppm (262 µg/M^3)
Maximum Two-Hour Average	0.3 ppm (786 µg/M^3)
Maximum One-Hour Average	0.42 ppm (1090 µg/M^3)
(3) Hydrogen Sulfide	
Maximum One-Hour Average	0.01 ppm (14 µg/M^3)
(4) Carbon Monoxide	
Maximum Eight-Hour Average	8 ppm (19mg/M^3)
Maximum One-Hour Average	30 ppm (34mg/M^3)
(5) Total Oxidants (Measured as Ozone)	
Maximum Twenty-Four Hour Average	0.02 ppm (39 µg/M^3)
Maximum One-Hour Average	0.05 ppm (137 µg/M^3)

(6) Hydrogen Fluoride

Maximum One-Month Average	1 ppb (0.818 $\mu g/M^3$)
Maximum One-Week Average	2 ppb (1.636 $\mu g/M^3$)
Maximum Twenty-Four Hour Average	3.5 ppb (2.863 $\mu g/M^3$)
Maximum Twelve-Hour Average	4.5 ppb (3.681 $\mu g/M^3$)

(7) Total Fluorides

Dry weight basis (as F^-) in and on forage for consumption by grazing ruminants

The following concentrations are not to be exceeded:

Average concentration of Monthly Samples Over Growing Season (not to exceed 6 consecutive months)	40 ppm (w/w)
Two Consecutive Months Average	60 ppm (w/w)
Any One-Month Average	80 ppm (w/w)

(8) Odors

At any time not to exceed	7 dilutions

4. TIME SCHEDULE FOR ACHIEVING AMBIENT AIR QUALITY STANDARDS

(1) In those areas of the Commonwealth where existing air contaminant concentrations are equal to or less than the ambient air quality standards expressed in Section 3 of this Regulation, such standards shall be in effect as of the effective date of this Regulation.

(2) In those areas of the Commonwealth which constitute in whole or in part a Federal Air Quality Control Region the time schedule for achievement of the ambient air quality standards in Section 3 of this Regulation shall be determined on an individual basis. Such determination shall take into consideration the existing air quality within that Region, and may include, where deemed appropriate, interim standards and time schedules for their applicability. Each time schedule determined under this section shall be adopted after public hearing in the Region so effected, and shall be appended hereto.

(3) (Presented and adopted unanimously in Resolution form)

Whereas, the Kentucky Air Pollution Control Commission desires to adopt statewide standards of air quality to protect and enhance the purity of its air resources; and, Whereas, the determination of a firm time schedule is dependent on technical information not yet fully developed.

Now, therefore, be it resolved that this Commission intends to achieve the air quality defined by the adopted standards within a period of three years. At such time as the necessary technical studies are completed, should the information so obtained indicate that this initial time estimate was incorrect, then appropriate adjustments will be made and a final time schedule established for inclusion in Section ., Regulation No. 9.

5. METHODS OF MEASUREMENT

(1) Air contaminants shall be measured by the method or methods listed in Table 1, or by such other methods approved by the Kentucky Air Pollution Control Commission.

(2) Air Contaminant samples shall be taken with sufficient frequency to obtain a statistically valid representation of concentration for the time-averaging period defined in Section 3 of this Regulation.

(3) Annual averages and three-month averages shall be determined on the basis of any consecutive twelve-month interval or any consecutive three-month interval, respectively.

6. ABBREVIATIONS USED IN THIS REGULATION

gm = gram
mg = milligram
µg = microgram
M = meter
cm = centimeter
sq = square
mo = month
COH = Coefficient of Haze
ppm = parts per million by volume
ppb = parts per billion by volume
w/w = weight by weight

Adopted this 22nd day of January, 1970.

The undersigned, Ralph C. Pickard, states that he is Secretary of the Kentucky Air Pollution Control Commission and that the foregoing regulation was duly adopted by the Commission at meeting held in Frankfort, Kentucky, on the 22nd day of January, 1970.

Witness my hand this the 22nd day of January, 1970.

Ralph C. Pickard, Executive Secretary
Kentucky Air Pollution Control Commission

Examined and approved as to legality.

David C. Short

David C. Short, Staff Attorney
Kentucky Air Pollution Control Commission

Final Draft
July 9, 1970

PROPOSED REGULATION NO. 11

KENTUCKY AIR POLLUTION CONTROL COMMISSION

SUBJECT: PREVENTION AND CONTROL OF EMISSIONS OF PARTICULATE MATTER FROM PROCESS OPERATIONS

1. PURPOSE

This regulation is adopted for the purpose of preventing, abating, and controlling air pollution caused by particulate matter emitted into the atmosphere from process operations.

2. DEFINITIONS

As used in this regulation, unless the context clearly indicates otherwise, the following words shall have the following meaning:

(1) "Person" means any individual, public or private corporation, political subdivision, government agency, municipality, industry, co-partnership, association, firm, trust, estate, or other entity whatsoever;

(2) "Particulate Matter" means any material except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions.

(3) "Standard Conditions" are 60°F, 14.7 psia;

(4) "Process Operations" means any method, form, action, operation, or treatment of manufacturing or processing, and shall include any storage or handling of materials or products before, during, or after manufacturing or processing.

DEFINITIONS (Continued)

(5) "Source Operation" means the last operation preceding the emission of particulate matter which results (1) in the separation of the particulate matter from the process materials or (2) in the conversion of the process materials into particulate matter, but does not include an air pollution abatement operation;

(6) "Process Weight" means the total weight of all materials introduced into any source operation which may cause any emission of particulate matter. Process weight includes solid fuels charged, but does not include liquid and gaseous fuels charged or combustion air;

(7) "Process Weight Rate" means a rate established as follows:

(a) For continuous or long-run steady state source operations, the total process weight for the entire period of continuous operation or for a typical portion thereof, divided by the number of hours of such period or portion thereof.

(b) For cyclical or batch unit operations, or unit processes, the total process weight for a period that covers a complete operation or an integral number of cycles, divided by the hours of actual process operation during such a period.

Where the nature of any process operation or the design of any equipment is such as to permit more than one interpretation of this definition, the interpretation which results in the minimum value for allowable emission shall apply.

DEFINITIONS (Continued)

(8) "New Installation" means process operations, the installation or construction of which is begun after the effective date of this regulation;

(9) "Existing Installations" means process operations installed or under construction prior to the effective date of this regulation.

(10) "Duplicate Source Operation" means any combination of two or more individual source operations of any size that have the same nomenclature, either formally adopted and/or commonly sanctioned by usage, such as, but not limited to two or more rotary dryers, basic oxygen furnaces, or electric arc furnaces contained in the same plant.

(11) "Fugitive Particulate Matter" means any particulate matter generated by a process operation which is emitted into the open air from points other than a stack outlet.

(12) "Commission" means the Kentucky Air Pollution Control Commission.

3. PROHIBITION OF PARTICULATE EMISSIONS

(1) No person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any new installations of process operations which is darker in shade than that designated as No. 1 on the Ringelmann Smoke Chart as published and described by the U.S. Bureau of Mines Bulletin 8333, hereinafter referred to as the Ringelmann Smoke Chart; or of such opacity as to obscure an observer's view to a degree equal to or greater than does particulate matter described in section 3 (1) of this regulation.

(2) No person shall cause, suffer, allow or permit the emission into the open air of particulate matter from any existing installations of process operations which is as dark or darker in shade than that designated as No. 2 on the Ringelmann Smoke Chart as published and described by the U. S. Bureau of Mines Bulletin 8333, hereinafter referred to as the Ringelmann Smoke Chart; or of such opacity as to obscure an observer's view to a degree equal to or greater than does particulate matter described in section 3 (2) of this regulation.

(3) No person shall cause, suffer, allow, or permit particulate matter to be vented into the open air from any source operation, or from all air pollution control equipment installed on any source operation in excess of the quantity specified in Table 1 of this regulation.

(4) The process weight rate entry to be used in Table 1 for duplicate source operations, components of which are vented through a common stack, is the total, or combined, operating process weight rate of all the individual component source operations.

When more than one source operation or combinations thereof, which are a part of a duplicate source operation, are vented through separate stacks, the allowable stack emission rate for each separate stack shall be determined by the following formula:

$$R_s = R_t \frac{W_s}{W_t}$$

Where: $\underline{R_s}$= allowable stack emission rate for the separate stack venting the source operation in question.

$\underline{R_t}$= total allowable emission rate for the duplicate source operation as if vented through one common stack (from Table 1)

$\underline{W_s}$= operating process weight rate for the source operation(s) vented through the separate stack.

$\underline{W_t}$= total operating process weight rate for the duplicate source operation.

4. POTENTIAL HAZARDOUS PARTICULATE EMISSIONS

Persons responsible for a source operation(s) or duplicate source operation(s) from which hazardous particulate matter may be emitted such as, but not limited to lead, arsenic, beryllium, silica, and other such materials shall give the utmost care and consideration to the potential harmful effects of the emissions resulting from such activities. Evaluations of these facilities as to adequacy, efficiency and emission potential will be made on an individual basis by the Commission.

5. FUGITIVE PARTICULATE MATTER

(1) No person shall cause, suffer, allow or permit any process operation to operate that is not equipped with a fugitive particulate matter control system. This system shall be operated in such a manner as to minimize the emission of fugitive particulate matter to a level satisfactory to the Commission.

(2) All persons shall maintain control of fugitive particulate matter at all times by control procedures such as, but not limited to, paving or oil treating of roads and covering of haulage vehicles to prevent atomspheric entrainment of particulate matter.

(3) Good operating practices, acceptable to the Commission, shall be observed in relation to stockpiling and general maintenance to prevent generation of particulate matter and atmospheric entrainment.

6. TESTING AND SAMPLING

(1) Whenever the Commission has reason to believe that the emission limits of this regulation are being violated, it may require the owner to conduct or have conducted at the owner's expense, tests to determine the particulate matter emission level, which tests shall include stack tests if circumstances so demand. The Commission may require that such tests be conducted in the presence of Commission representatives.

(2) Should the Commission wish to conduct tests of its own to determine compliance with emission limits of this regulation, the owner shall provide at no expense to the Commission, reasonable and necessary sampling ports in stacks, vents, and ducts, along with safe and easy access thereto including a suitable power source to the point of testing.

(3) The Commission shall be supplied with such data as it may require to establish test conditions.

(4) Any stack serving any source operation, or duplicate source operation, or air pollution control equipment on any source operation shall contain flow straightening devices or a vertical run of sufficient length to establish flow patterns consistent with acceptable stack sampling procedures.

(5) Stack tests for particulate matter shall be made by methods found in ASME "Power Test Code PTC 27," dated 1957, titled "Test Code for Determining Dust Concentration in Gas Streams" or by such other methods approved by the Kentucky Air Pollution Control Commission.

7. COMPLIANCE WITH EMISSION LIMITATIONS

This regulation shall be effective upon adoption.

8. In any area where ambient air standards are not being attained more stringent emission levels may be fixed by the Commission.

9. Nothing in this regulation is intended to permit any practice which is in violation of any statute, ordinance or regulation.

Effective________________

TABLE I

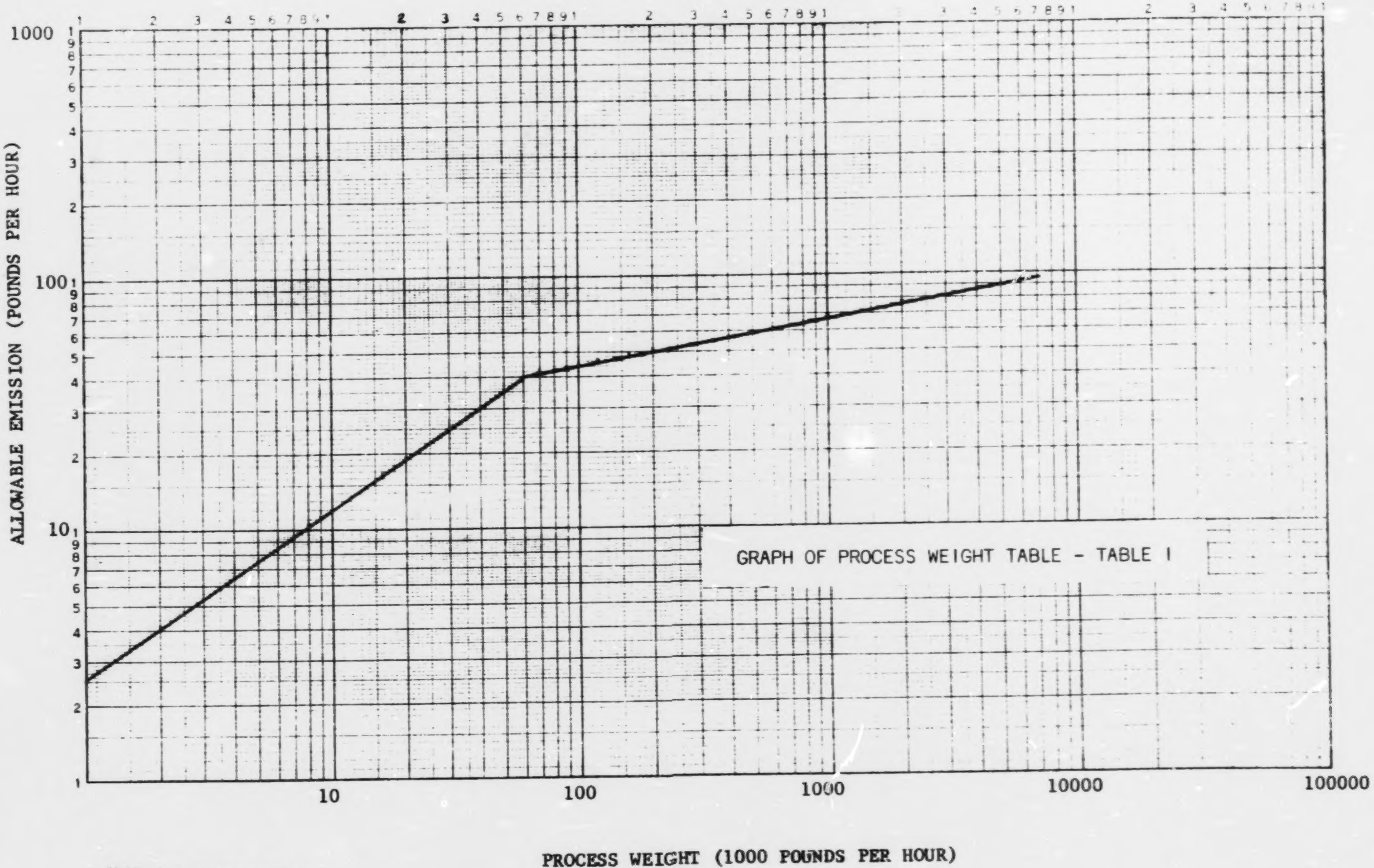
PROCESS WEIGHT RATE (1) (2)		MAXIMUM ALLOWABLE EMISSION RATE
Lb/Hr.	Tons/Hr.	Lb/Hr.
100	0.05	0.551
200	0.10	0.877
400	0.20	1.40
600	0.30	1.83
800	0.40	2.22
1000	0.50	2.58
1500	0.75	3.38
2000	1.00	4.10
2500	1.25	4.76
3000	1.50	5.38
3500	1.75	5.96
4000	2.00	6.52
5000	2.50	7.58
6000	3.00	8.56
7000	3.50	9.49
8000	4.00	10.4
9000	4.50	11.2
10000	5.00	12.0
12000	6.00	13.6
16000	8.00	16.5
18000	9.00	17.9
20000	10.00	19.2
30000	15.00	25.2
40000	20.00	30.5
50000	25.00	35.4

TABLE I (Continued)

PROCESS WEIGHT RATE (1) (2)		MAXIMUM ALLOWABLE EMISSION RATE
Lb/Hr.	Tons/Hr.	Lb/Hr.
60000	30.00	40.0
70000	35.00	41.3
80000	40.00	42.5
90000	45.00	43.6
100000	50.00	44.6
120000	60.00	46.3
140000	70.00	47.8
160000	80.00	49.0
200000	100.00	51.2
1000000	500.00	69.0
2000000	1000.00	77.6
6000000	3000.00	92.7

(1) Interpolation of the data in Table I for process weight rates up to 60,000 lb/hr shall be accomplished by use of the equation $E = 4.10 P^{0.67}$ and interpolation and extrapolation of the data for process weight rates in excess of 60,000 lb/hr shall be accomplished by used of the equation $E = 55.0 P^{0.11} - 40$, where E = rate of emission in lb/hr and P = process weight rate in tons/hr.

(2) See Section 3 (4) for duplicate source operations.



GRAPH OF PROCESS WEIGHT TABLE - TABLE I

NOT REPRODUCIBLE

SUPPORTING INFORMATION FOR DRAFT OF REGULATION NO. 11

Your attention is directed to three concepts incorporated in the regulation.

The first is the duplicate source concept which is as follows: A formula is given to be used on a multiple-similar source operation (called a duplicate source operation) whereby a more equitable, although not excessive, over all emission is allowed for the total installation. One major objection to the process weight curve is over-come by use of the duplicate source formula. The objection is that installations which vent to a common stack are penalized by being allowed a lesser emission than one which vents to more than one stack. By using the duplicate source formula, any two duplicate source operations involving like numbers of equipment and processing like amounts of materials would be allowed the same total emission regardless of how they vent their emissions. The total allowable emission for the duplicate source operation venting to two or more stacks is distributed out each of the stacks according to the percentage of the total operation process weight rate associated with any stack in question. An example of how the duplicate source formula can be applied is given in a separate attachment (See Attachment No. 1). This example is for illustrative purposes only and is not intended to single out a particular industrial operation. The method of application would be similar for all industries having duplicate source operations. The duplicate source concept has just recently been adopted in West Virginia (Regulation VII) and is considered a beneficial addition to the process particulate regulation.

The second is the section on Potential Hazardous Particulate Emissions. The language in this section was also adopted in West Virginia's Regulation VII in its entirety and is believed to broaden the scope of the proposed regulation. It gives the Commission an extra tool to handle and control noxious particulate matter emissions. It puts additional notice upon an industry with this type of emission potential that such emissions may require more stringent controls than that indicated by the process weight table approach.

The third is the section on Fugitive Particulate Matter. Fugitive particulate matter, often called fugitive dust, results in numerous complaints to the Air Pollution Control Commission and warrants separate consideration because it cannot be treated properly under other provisions of the regulation.

ATTACHMENT NO. 1

EXAMPLE OF DUPLICATE SOURCE CONCEPT

Consider the following:

Two asphalt plants
Each has two rotary dryers
Capacity of dryers: 180 TPH and 120 TPH
*Plant No. 1 has both dryers vented to a common stack
*Plant No. 2 has each dryer vented to a separate stack
Each plant is a duplicate source operation with a combined process weight rate of 300 TPH or 600,000 lbs./hr.

From the process weight curve, Plant No. 1 would be allowed an emission of 62 lb./hr. .

USING DUPLICATE SOURCE CONCEPT ON PLANT NO. 2

The emission allowed from each of the two stacks can be derived as follows:

STACK TO DRYER NO. 1

Dryer capacity= 180 TPH = 360,000 lbs./hr.

From process weight curve using a process weight rate of 360,000 lbs./hr. this dryer would be allowed 56 lbs./hr without duplicate source concept. For duplicate source concept, this dryer is allowed

$$(62)\frac{180}{300} = 37.2 \text{ lbs./hr.}$$

STACK TO DRYER NO. 2

Dryer capacity = 120 TPH =240,000 lbs./hr.

From the process weight curve using a process weight rate of 240,000 lbs./hr. this dryer would be allowed 52 lbs./hr. without duplicate source concept. For duplicate source concept, this dryer is allowed

$$(62)\frac{120}{300} = 24.8 \text{ lbs./hr.}$$

The total emission allowed for Plant No. 2 equals the same as Plant No. 1 or 62 lbs./hr.

NOTICE THAT WITHOUT THE DUPLICATE SOURCE CONCEPT PLANT NO. 2 COULD HAVE BEEN ALLOWED AN EMISSION OF 108 LBS./HR.

NOTE: TPH = tons per hour
lb./hr = pounds per hour

4.2 PROPOSED REGULATIONS

It is proposed that selected portions of the existing State regulations be modified and that additional regulations be included as indicated.

4.2.1 Prohibition of Open Burning - Regulation No. 2

Exception numbers (3), (5), (6), (7) and (9) to the provisions of the regulation will be deleted for application in the Cincinnati AQCR.

4.2.2 Prevention, Abatement and Control of Air Contaminants from Incinerators - Regulation No. 3

This regulation provides exception for backyard waste burners or incinerators from the visible emission standards established by this regulation. These exceptions shall be deleted for application in the Cincinnati AQCR and the visible emission standard modified to Ringelmann No. 1 or equivalent opacity. The particulate emission standard will be 0.2 pounds of particulate per 100 pounds of waste charged on a mass emission rate basis.

4.2.3 Prevention, Abatement and Control of Air Contaminants from Waste Burner - Regulation No. 4

Backyard waste burners and incinerators are excepted from the provisions of this regulation. These exceptions will be deleted from this regulation for application in the Cincinnati AQCR. The visible emission standard for approved categories of waste burners has been made more stringent with visible emissions reduced to Ringelmann 1 and particulate emission not to exceed 0.2 pounds per 100 pounds of waste charged.

4.2.4 Prevention and Control of Emission of Particulate Matter from Combustion of Fuel in Indirect Heat Exchangers - Regulation No. 7

Existing regulation No. 7 is not consistent with the selected control strategy for application in the Cincinnati AQCR. An additional particulate emission rate will be added to the regulation which will incorporate the emission standards projected in Figure 1, the visible emission standard will be made more stringent and changed to Ringelmann No. 1 or equivalent opacity with a provision permitting emissions not to exceed Ringelmann No. 3 for a period of 3 minutes in any sixty minute period.

4.2.5 Control of Sulfur Oxide Emissions

Existing regulations do not include a regulation for limiting sulfur content of combustion fuels or sulfur emissions from industrial processes. A proposed regulation for each of these sources has been added as Regulation 12 and 13, respectively.

REGULATION NO. 12

RESTRICTION OF EMISSIONS OF SULFUR DIOXIDE FROM USE OF FUEL

A. GENERAL PROVISIONS

(1) This regulation shall apply to any installation in which fuel is burned and in which the sulfur dioxide emission is largely due to the content of the fuel burned, and in which the fuel is burned primarily to produce heat or power by indirect heat transfer.

(2) For purposes of the regulation, a fuel-burning installation is any single fuel-burning furnace or boiler or other unit, device, or contrivance in which fuel is burned or any grouping of two or more such furnaces or boilers or other units, devices, or contrivances on the same premises or otherwise located in close proximity to each other and under control of the same person. The capacity of such installations shall be the manufacturer's or designer's guaranteed maximum heat input rate whichever is greater.

(3) The method for determining the percent of sulfur in coal shall be that described in ASTM D-271-64, Standard Methods of Laboratory Sampling and Analysis of Coal and Coke or equivalent method approved by the Director. The method for determining the heat content of coal shall be described in ASTM D-271-74, Standard Methods of Laboratory Sampling and Analysis of Coal and Coke or D-2015-62T, Tentative Method of Test for Gross Calorific Value of Solid Fuel by the Adiabatic Bomb Calorimeter. All coal analyses and heat

contents are to be made on a dry basis. Moisture content of coal is to be determined in all cases and results reduced to facilitate calculations of actual pollutants. The method for determining the sulfur content of fuel oil shall be that described in ASTM D-129-64 Standard Method of Test for Sulfur in Petroleum Products by the Bomb Method. The method for determining the heat content of fuel oil shall be that described in ASTM D-240-64 Standard Method of Test for Heat of Combustion of Liquids by Bomb Calorimeter or other method giving comparable results. The testing methods specified in the subsection A (3) are hereby made a part of this regulation, by reference.

(4) The Director is authorized to take samples of any fuel by any appropriate means for the sampling of the quantity which he finds, at any reasonable time or place, for purposes of determining compliance with this regulation. Where applicable, the following methods will be used.

For coal: ASTM: D-492-48 (1958), Standard Method of Sampling Coals Calssified According to Ash Content

ASTM: D-2013-64T, Tentative Method of Preparing Coal Samples for Analysis

ASTM: D-2234-65T, Tentative Method for Mechanical Sampling of Coal

For oil: ASTM: D-270-64, Standard Method of Sampling Petroleum and Petroleum Products

B. PROHIBITIONS

(1) No person shall burn, sell or make available for sale for burning in fuel burning equipment, any fuel containing in excess of 1% sulfur by weight after July 1, 1970 except for fuel combustion units having heat capacities in excess of 200 million BTU/hr.; for these units fuel in excess of 1.25% sulfur by weight are prohibited.

(2) Any person offering to sell or deliver fuel or any person responsible for fuel burning equipment, shall, upon request, submit to the Department such analyses of the fuel as may be required to determine compliance with these regulations.

(3) It shall be unlawful for any person to import, sell, offer for sale, expose for sale, exchange, deliver or transport for use and consumption in the State of Kentucky or to use or consume in the State of Kentucky any fuel which does not meet the requirements of this regulation.

(4) Fuels in excess of the limits set out in B (1) above may be burned, sold or made available for sale for burning in fuel burning equipment on which control equipment to desulfurize stack gases has been installed or other methods or devices are used that will produce results equivalent to those that would have resulted from the burning of fuel containing one percent sulfur by weight or less without these added control features

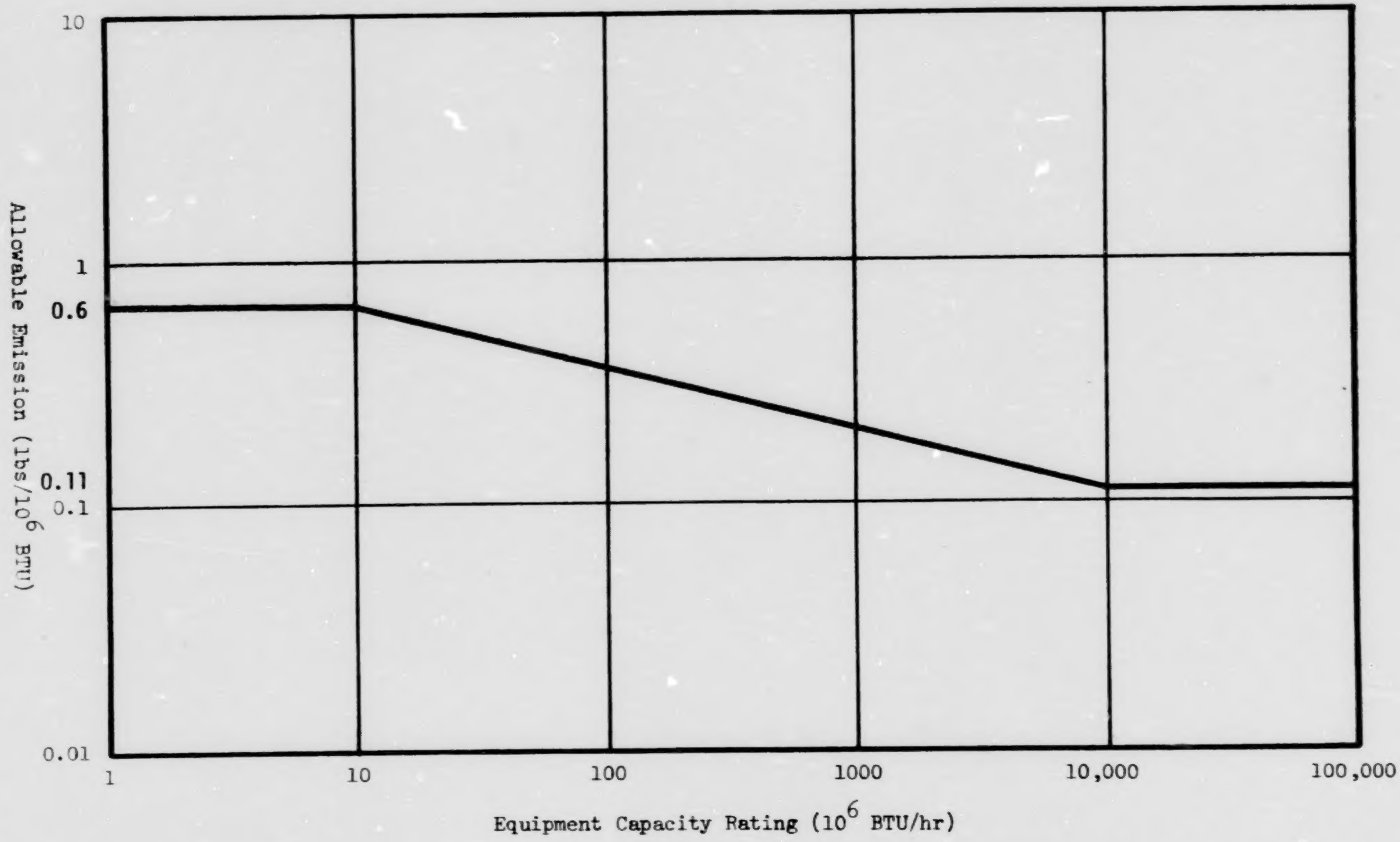


Figure 1. Allowable Particulate Emissions from Fuel Combustion for Indirect Heating.

REGULATION NO. 13
RESTRICTION ON EMISSION OF SULFUR OXIDES FROM INDUSTRIAL PROCESSES

A. GENERAL PROVISIONS

(1) The method of measuring sulfur oxides in stack gases shall be the Shell Development Company method as published in "Atmospheric Emissions from Sulfuric Acid Manufacturing Processes." Public Health Service Publication 999-AP-13. Appendix B, 85-7 which publication is made a part of this regulation by reference.

(2) The method of measuring sulfur trioxide, sulfuric acid, or any combination thereof in stack gases shall be the modified Monsanto Company method as published in "Atmospheric Emissions from Sulfuric Acid Manufacturing Processes." Public Health Service Publication 999-AP-13. Appendix B, 61-6 which publication is made part of this regulation by reference.

(3) Other test methods approved by the Director may be used.

B. CONCENTRATION OF SULFUR COMPOUNDS IN EMISSIONS RESTRICTED

(1) No person shall cause or permit the emission of sulfur oxides into the atmosphere from any existing sulfuric acid plant exceeding 36 pounds and from any new sulfuric acid plant exceeding 9 pounds per ton of acid (98%) produced, respectively.

(2) No person shall cause or permit the emission into the atmosphere from any sulfuric acid plant of acid mist exceeding 0.5 pounds per ton of acid (98%) produced.

(3) No person shall cause or permit the emission into the atmosphere of gases containing more than 2000 parts per million of sulfur oxides by volume.

5. EMERGENCY EPISODE AUTHORITY AND PROCEDURES

The purpose of an Emergency Episode Plan is to prevent the ambient concentrations of pollutants from ever reaching levels where it appears that the health, safety and welfare of the community may be in danger. The objective of this Emergency Episode Plan is to temporarily control sources within the Kentucky portion of the MCIAQCR during episode periods when dilution is not adequate to prevent high ground level concentrations of pollutants. Planning for emergency episodes assures that the reduction of emissions from sources is conducted in a well-structured manner with minimum inconvenience to the emitters as well as the citizens of Kentucky.

The Emergency Episode Plan is presented in the following sections. The Plan is designed for the emergency control of particulates and sulfur oxides. Emergency episode plans for other pollutants such as carbon monoxide, oxidants and nitrogen oxides will be submitted to the Secretary of the Department of Health, Education and Welfare later.

The proposed Emergency Episode Plan is viewed as a mechanism that will eventually be sensitive to all air contaminants which may be hazardous to human health during episodes. That is to say, the Plan that is outlined for development is designed with an awareness of the future requirements of the State. The intensity of study which supports the development of the proposed Plan is justified on the grounds that the emergency control of pollutants, in addition to particulates and sulfur oxides, will be eventually coordinated by one common Plan.

5.1 COMPREHENSIVE EMERGENCY EPISODE PLAN

The comprehensive Emergency Episode Plan is an outline of the steps that will be taken by Kentucky to establish a viable episode organization.

The Plan is based on the MCIAQCR episode organization as presented in Appendix C of this report. Since episodes are regional problems, cooperation among the jurisdictions in the MCIAQCR will be mandatory. The utilization of the MCIAQCR EOCC* will assist the cooperative effort.

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*Emergency Operations Control Center

The comprehensive Plan is viewed as an outgrowth of the interim Plan which is presented in Section 5.2. The interim plan calls for a number of specific actions which are recommended for episode avoidance. The comprehensive Plan, once developed, will replace parts of the interim Plan with an approach which is based on scientific and engineering facts. The comprehensive Plan will provide for intensive evaluation of emission sources as well as air quality and meteorological parameters to insure sensitivity tto the needs of the Kentucky portion of the MCIAQCR.

5.1.1 Episode Criteria

The following episode criteria will trigger preplanned emergency episode actions in the Kentucky portion of the MCIAQCR:

1. Status: "Forecast" - An internal watch will be activated on the basis of a Weather Bureau HAPPA* or equivalent indication that a high air pollution potential will exist for the next 36 hours.
2. Status: "Alert" - At the initiation of, and periodically during a "Forecast" period, upon air quality information for the preceding 24-hour period that the average sulfur dioxide level is equal to or exceeds 0.10 ppm and the soiling index for the same period is equal to or exceeds 2.0 COHs, an "Alert" status is established.
3. Status: "Warning" - If for any consecutive 24-hour period during an "Alert", the average sulfur dioxide level is equal to or exceeds 0.25 ppm and the soiling index for the same period is equal to or exceeds 4.0 COHs, a "Warning" status is established.
4. Status: "Emergency" - If during the "Warning" period, it appears imminent that for a 24-hour period, the average sulfur dioxide level will equal or exceed 0.40 ppm and the soiling index for the same period will equal or exceed 6.0 COHS, an "Emergency" status is established.
5. Status: "Termination" - Once declared, any status reached by application of these criteria will remain in force until the criteria for that status are no longer met. At such time, the next lower status will be resumed. This procedure will continue until the episode is terminated.

Emergency actions will be taken by each state when any monitoring site within the MCIAQCR records ambient air quality in excess of that designated in the criteria. Adverse air quality need not be regionwide to trigger emergency control actions. Also, the Alert, Warning, and Emergency stages can and should be activated on the basis of deteriorating air quality alone; a High Air Pollution Potential Advisory need not be in effect.

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*High Air Pollution Potential Advisory

The entire Emergency Episode Plan operates around the relationship between the measured air quality during the episode and the predetermined levels established by the episode criteria. The relationship between criteria and the remainder of the Plan is illustrated in Figure 5-1.

5.1.2 Episode Communications

Kentucky, as a member of the Air Pollution Control Officers(APCO)Committee will actively participate in MCIAQCR episode activities. Through the EOCC, the field inspection program and the State air pollution officials will be in direct contact with the organizations listed in Table 5-1.

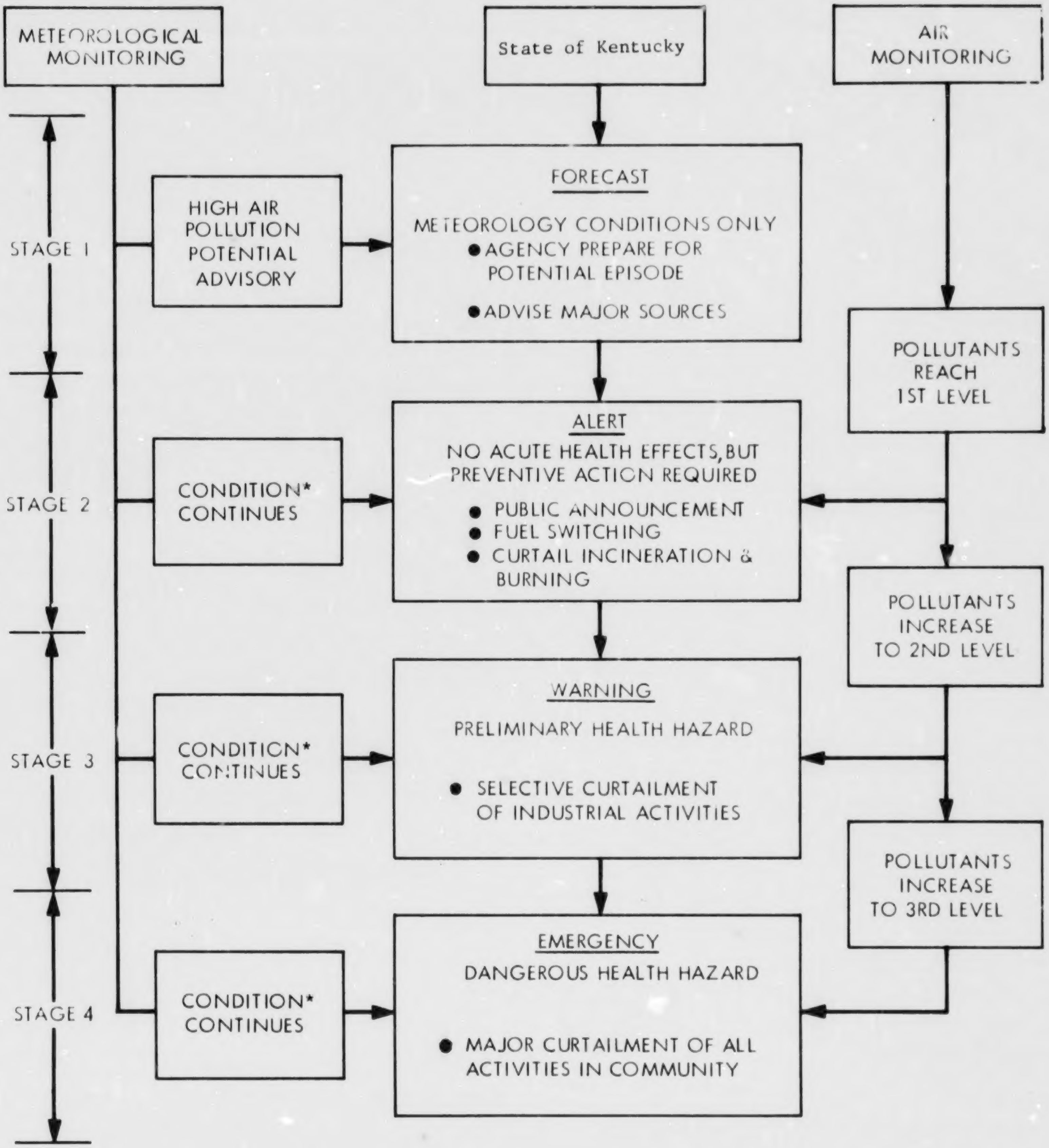
Table 5-1. ORGANIZATIONS CONTACTED DURING EPISODES

- Legal Authority
- Emission Sources
- NAPCA
- Air Quality Data Sources
- Meteorological Data Sources
- Neighboring Jurisdictions
- Other State and Local Governmental Departments
- News Media
- Hospitals
- Telephone Company

5.1.2.1 Communications Center

The objective of the MCIAQCR EOCC is to serve as the facility for reception and processing of data relating to air pollution episodes and for determination of avoidance actions. It will accept information, process raw information into intelligence data, and determine corrective actions. The implementation of specific source control actions will be left to the individual states.

During air pollution episodes, the MCIAQCR EOCC will be manned by the present staff of the City of Cincinnati and personnel from the state agencies in Ohio, Kentucky, and Indiana. Other specialists, such as physicians, may also be called upon to volunteer their services during


METEOROLOGICAL MONITORING
State of Kentucky
AIR MONITORING
STAGE 1
HIGH AIR POLLUTION POTENTIAL ADVISORY
FORECAST
METEOROLOGY CONDITIONS ONLY
● AGENCY PREPARE FOR POTENTIAL EPISODE
● ADVISE MAJOR SOURCES
POLLUTANTS REACH 1ST LEVEL
STAGE 2
CONDITION* CONTINUES
ALERT
NO ACUTE HEALTH EFFECTS, BUT PREVENTIVE ACTION REQUIRED
● PUBLIC ANNOUNCEMENT
● FUEL SWITCHING
● CURTAIL INCINERATION & BURNING
POLLUTANTS INCREASE TO 2ND LEVEL
STAGE 3
CONDITION* CONTINUES
WARNING
PRELIMINARY HEALTH HAZARD
● SELECTIVE CURTAILMENT OF INDUSTRIAL ACTIVITIES
POLLUTANTS INCREASE TO 3RD LEVEL
STAGE 4
CONDITION* CONTINUES
EMERGENCY
DANGEROUS HEALTH HAZARD
● MAJOR CURTAILMENT OF ALL ACTIVITIES IN COMMUNITY

*While poor meteorological conditions will continue to be present, a formal HAPPA statement by ESSA is not a requirement.

Figure 5-1. KENTUCKY EPISODE SEQUENCE

the serious stages of episodes. In general, they will recommend appropriate actions as well as assist in the interpretation of air quality data, meteorological factors, public health effects, and engineering considerations.

The staff requirements for episode actions under the comprehensive Episode Plan will be similar to the staff identified for the interim Plan in Table 5-5. All of the staff, except for the technicians, field inspectors, and enforcement personnel (who have field responsibilities) will report to the EOCC when so directed. Staffing schedules will be determined by the APCO Committee so that the center will be manned on a 24-hour basis during the more severe stages of an episode. During each episode, a team will be selected to prepare a post-episode report. This team will coordinate with NAPCA in preparing such a document.

Nearly all communications will be conducted over standard telephone lines. Dedicated telephone lines may be installed to assure communications with such organizations as: major sources of pollution, ESSA, and NAPCA. Such channels may be required because of the heavy load that will be placed on the regular telephone system during episodes.

A fleet of two-way radio equippped automobiles will be needed for air quality inspection, source inspection, and enforcement to maintain continuous contact with the field and to assure adequate surveillance of the emergency conditions.

Equipment needed in the EOCC in addition to standard items such as conference tables, typewriters, and calculators include wall charts and maps for display of:

- Air Quality Data
- Meteorological Information
- Source Control Data
- Traffic Flow Patterns

Essential equipment for the EOCC will be purchased and installed according to the time schedule presented in Section 5.1.6.

5.1.2.2 Communications Manual

A Communications Manual will be developed to simplify the procedure of communicating with the organizations listed in Table 5-1. The Manual will specify the operations to be followed by each member of the EOCC operating staff at each episode stage. The Manual will also identify the steps to be taken by field personnel.

A series of prepared press releases will be included in the Manual for immediate release during the early stages of an episode. Procedures for publicizing these messages and other specially prepared announcements will be clearly presented.

5.1.3 Episode Surveillance

5.1.3.1 Air Quality Monitoring

During episodes, short-period averages of air quality measurements will be available from four fixed stations described in Section 6.1. Three of these sites are in Ohio and one in Kentucky. Initially, only the existing CAMP station located near downtown Cincinnati will be in operation; but all four should be operative by fall of 1971, the season of greatest episode probability.

Continuous sulfur dioxide analyzers at each site will permit averages to be obtained for sampling periods as short as 15 minutes and running sums, averages, or combined indices over longer periods as required, updated hourly.

Tape samplers will be used to provide soiling measurements at all sites. They will be equipped with recorders for real-time measurements and easier retrospective analysis. Normal sequential sampling interval is two hours; however, the sampling time will be reset for hourly or half-hourly intervals when ambient concentrations are high.

Concentrations of suspended particulates will be measured by hi-vol samplers, one at each station. During non-episode periods, hi-vols will be set to take a midnight-to-midnight reading on a schedule of operation yet to be determined. One schedule under consideration calls for hi-vol operation every third day. However, during episodes hi-vols will be operated at maximum frequency consistent with the work load.

5.1.3.2 Meteorological Monitoring

During episode periods, both predictive and observational weather information may be required. The revised Federal Mesometeorological Plan developed by the U.S. Environmental Science Services Administration (ESSA) provides for the establishment of an ESSA Meteorological Support Unit (EMSU) for the MCIAQCR. This unit consists of an urban (air pollution) meteorologist, a technical assistant, and two technicians. The technicians normally take two low level soundings a day, one near daybreak and one early in the afternoon near the time of maximum mixing height. During episodes one or two additional soundings may be taken.

Low level soundings provide vertical profile data on temperature and wind, and derivative data such as mixing height, transport wind, and ventilation index. They differ from ordinary rawinsonde observations in that they utilize a slow-rising balloon to allow high resolution and terminate at 10,000 feet. An observational site for taking low level soundings has not yet been determined. Sites that are representative of urban conditions are preferred to the airport sites used for ordinary rawinsondes.

The target date for EMSU implementation is during fiscal year 1972. However, shortage of funds and qualified manpower has resulted in long delays in establishing EMSU units at many designated regions. As an interim arrangement, therefore, meteorological support will be provided by the existing Weather Bureau facility at Greater Cincinnati Airport, located in Boone County, Kentucky. This office is directed to establish close working relations with air pollution control agencies and related interests in the metropolitan Cincinnati area. Since the present office is responsible for the full spectrum of weather services to the community as well as support to aviation, it lacks the resources for a complete service to air quality control activity such as the EMSU specialists can provide. However, as a minimum the Weather Bureau office will furnish observational data and up-to-the-minute local advisories adapted from the High Air Pollution Potential Advisory (HAPPA), which is issued by the National Meteorological Center (NMC) at Suitland, Maryland.

The HAPPA message is disseminated over Teletype Service C daily at 1220 E.S.T. The criteria for issuing an advisory are so restrictive, particularly with regard to a minimum size for the affected area, that local communities may not be alerted by this means against limited incidents of high pollutant concentrations. Hence, service that is tailored to the needs of the region will go beyond mere adaptation of HAPPA messages. As a first step, arrangements will be made to have a daily air pollution potential sheet prepared by the Weather Bureau at Greater Cincinnati Airport, and the data routinely telephoned to the MCIAQCR EOCC.

Data will be adapted from the 0700 EST rawinsonde run taken at Wright-Patterson Air Force Base, Dayton, which is the closest reporting station for upper air temperature and wind data. When air pollution measurements reach or are expected to reach specified levels, the receiving office will relay the meteorological data and other pertinent information to the State agencies of Indiana, Ohio, and Kentucky. A sample information sheet is shown in Figure 5-2.

When the EMSU unit becomes operative, it will take over the responsibility for preparing, disseminating, and applying the daily air pollution potential sheet. Furthermore, the HAPPA program is expected to be decentralized, so that advisories will be better geared to local situations. Under this new arrangement, advisories for the MCIAQCR will originate from the Cleveland, Ohio Forecast Office.

In addition to the low level soundings that the EMSU unit will provide, pilot balloon ascents are made at the Greater Cincinnati Airport and at Standiford Field, Louisville, Kentucky, at 0100 and 1300 E.S.T. Observational data from Louisville are often indicative of conditions in the Cincinnati area a few hours in advance. During episodes, surface data from the following locations may also be useful:

- Lunken Airport
- Abbe Observatory (now operated by University of Cincinnati)
- MCIAQCR Surveillance Network: Four Primary Stations (See Section 6.1.1.)

One or more developmental types of instrumentation such as the radiothermosonde (scanning radiometer) may become operational in the near future.

Figure 5-2. DAILY ADVISORY FROM WEATHER BUREAU AT GREATER CINCINNATI AIRPORT

Date ______________________

AIR POLLUTION POTENTIAL SHEET

I. Temperatures (°F)	URBAN	RURAL
a. Maximum yesterday		
b. Minimum this morning		
c. Maximum this afternoon		

II. Mixing Depths (meters)		
a. Maximum yesterday		
b. Minimum this morning		
c. Maximum this afternoon		
d. Minimum tomorrow morning		
e. Maximum tomorrow afternoon		

III. Inversion Data (a.m.) (1. Surface; 2. Aloft)

	URBAN						
	Base	Top	Tx needed to break		Base	Top	Tx needed to break
	1.				1.		
	2.				2.		

IV. Winds	URBAN	RURAL
a. Surface at 1000 LST	Kt.	Kt.
b. Surface forecast	Kt.	
c. Morning AVW (Actual)	m/sec.	m/sec.
d. Afternoon AVW (Forecast)	m/sec.	m/sec.
e. Yesterday's observed AVW (1200)	m/sec.	m/sec.
(1800-1900)	m/sec.	m/sec.

V. Cloudiness	AMOUNT (0-10)
a. Today until 1900	
b. Tonight (1900 until 0700)	

VI. Ventilation	URBAN	RURAL
a. This afternoon (AVW X MXHT) $m^2/sec.$		

VII. Index

a. This morning (Actual) ______________________

b. This afternoon (Forecast) ______________________

c. Tomorrow morning (Forecast) ______________________

d. Tomorrow afternoon (Forecast) ______________________

It is still uncertain how these observational data will be utilized during an air pollution episode. They may be important inputs in short-period prediction models that are expected to be available. Certain developmental models of this type are predicated upon winds that vary in space and time. Interim application of these data remains qualitative and subjective and should be handled by an experienced meteorologist.

5.1.3.3 Data Handling

Data acquired during episodes will be handled as described in Section 6.1.4. However, the greater frequency and shorter sampling intervals prescribed for episodes will require a much heavier workload than normal. The extra level of effort involved both in observational procedures and in data reporting, reduction, and analysis will be consistent with manpower and program funding limitations. In light of criteria that have been established for determining whether manual and semi-automatic networks should be converted to telemetering, real-time data reduction systems, the planned network does not yet warrant real-time operation. However, the need and justification for this type of operation will be periodically reviewed.

5.1.3.4 Source Inspection

Under episode conditions, it is the principal field duty of the enforcement personnel to ascertain that the Emission Reduction Plan described in Section 5.1.5 is being executed. The available tools and procedures to exercise this function are the same as those used in normal operations (see Sections 6.2.1 and 6.2.2) except that emphasis will be placed upon quick action and rapid response measures. Equipment needed for communications is specified in Section 5.1.2.1.

Verification of compliance is sometimes difficult. For example, Ringelmann and opacity tests are of litttle use when a sulfur dioxide episode occurs. Since an effective control technology for particulates is available today and reduction of visible emissions will inevitably results after outlay of funds, effort, and public resolve, the major problem will become the enforcement of sulfur dioxide emission reduction. Violations might sometimes be traced through monitoring station measurements, but conclusive evidence must be obtained at the points of emission. It may be necessary to enter the premises of a suspected violator armed with necessary legal instruments and test equipment. Remedies may then come too late to affect the course of the episode. More direct, faster, legally admissible techniques for determining the amount and type of gaseous emission by scanning the plume from a distance will aid in achieving compliance with the Emission Reduction Plan.

5.1.4 Episode Legal Authority

Enabling legislation necessary for the implementation of emergency action exists in Kentucky. The discussion of episode legal authority is presented in Section 3 of this report.

5.1.5 Emission Reduction Plan

The objective of an Emergency Episode Plan is the temporary reduction of emissions during episodes. The Emission Reduction Plan (ERP) is that part of the total episode plan which directs the orderly and equitable control of source emissions. The ERP builds upon and utilizes the other parts of the episode plan that have been previously presented in Section 5.1, that is: episode criteria, surveillance networks, communications center, and legal authority.

An ERP objectively and quantitatively evaluates all sources within a region and selects the sources for control. The criteria for selection include technical feasibility and economic reasonableness of emergency control, minimal disruption of community activities, and others.

The ERP for the Kentucky portion of the MCIAQCR will be developed promptly after the submission of this Implementation Plan. Through engineering and economic analyses of the sources in the three-county area, a series of optimum emergency control strategies will be developed.

Cooperation among the numerous jurisdictions in the MCIAQCR is imperative in developing the Emission Reduction Plan. This is so because (1) the Plan, once adopted, must be executed on a regionwide basis; and (2) economics of scale will result by having one central unit, the APCO Committee, responsible for all episode avoidance activities of the Region.

Thus, in developing the Emission Reduction Plan for the MCIAQCR, some specific responsibilities will be performed by the Committee and others by the individual states. The separation of tasks and the procedure for developing the ERP is illustrated by the flowchart in Figure 5-3. The elements of the Emission Reduction Plan are summarized in Table 5-2.

To curtail emissions during episodes, a set of emergency strategies for achieving rapid stepwise reductions will be developed. Progressively more stringent control strategies will be specified for each episode level as greater emission reduction is required. Substantial background information will be necessary to determine the essential strategies.

As indicated in Figure 5-3, Emergency Control Questionnaires will be used in conjunction with Emission Reduction Guides to obtain the required technical and cost information from selected sources. The plans submitted by the surveyed sources will be reviewed and approved by the air pollution control agency of each state. Plans that are not acceptable will be returned to the source. If the source does not resubmit a plan, the air pollution control agency will make the necessary revisions. Such adjusted plans will be enforced during episodes.

Once alternative strategies have been evaluated, the optimum strategy will be announced to sources and the public with additional information on recommended procedures for acting and communicating during episodes.

5.1.6 Time Schedule for Emergency Episode Plan Development

The development of the Emergency Episode Plan will require significant time and effort to complete. A time schedule for the completion of essential requirements of the plan is presented in Figure 5-4. The schedule is based on estimates which assume State personnel will begin actively developing the Plan soon after the adoption of the Implementation Plan.

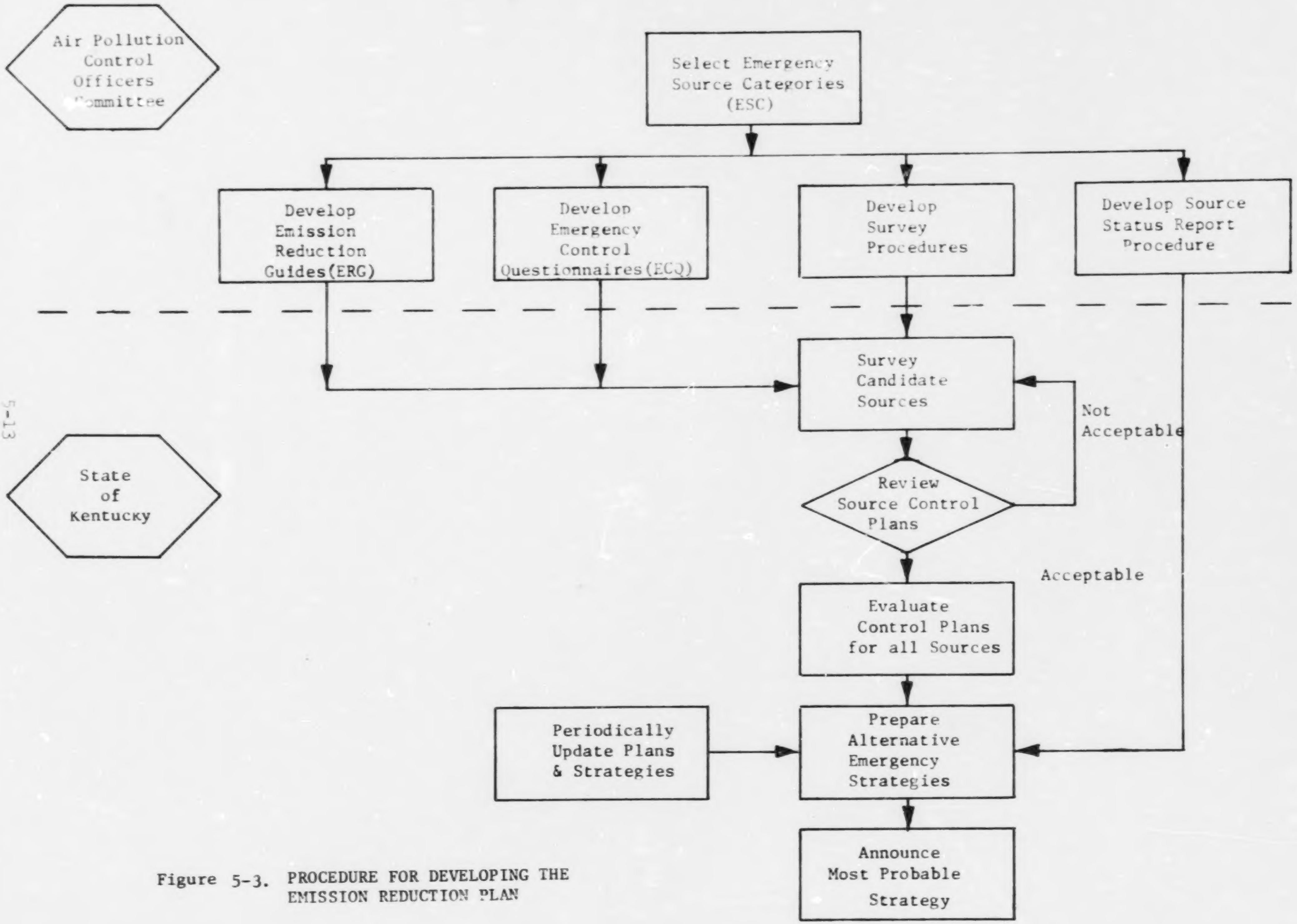

Air Pollution Control Officers Committee
State of Kentucky
Select Emergency Source Categories (ESC)
Develop Emission Reduction Guides(ERG)
Develop Emergency Control Questionnaires(ECQ)
Develop Survey Procedures
Develop Source Status Report Procedure
Survey Candidate Sources
Not Acceptable
Review Source Control Plans
Acceptable
Evaluate Control Plans for all Sources
Periodically Update Plans & Strategies
Prepare Alternative Emergency Strategies
Announce Most Probable Strategy

Figure 5-3. PROCEDURE FOR DEVELOPING THE EMISSION REDUCTION PLAN

Emergency* Source Category	Emission Reduction Guides	Emergency Control Questionnaires	Source Surveys	Source Status Reports	Emergency Instruction Notification
I	Detailed process and fuel combustion analysis per source category; extensive review of conventional & emergency control techniques	Complete examination of emissions control alternatives and direct and indirect effects on emitters, region, and nation.	Questionnaire followed by visitation and consultation.	Detailed report of immediate ability to control plus impact of actions on other sources and region.	Detailed instructions to sources on emissions control and communication responsibilities during an episode.
II & III	Review of fuel combustion and incineration operating techniques and emergency control alternatives	Quantification of emission curtailment alternatives and effectiveness	Questionnaire reviewed by telephone if necessary	Observation of fuels used	Instructions on required actions during an episode.
IV	None	None	None	Observation of traffic density	Instructions on required actions during an episode.

*See Table 5-3 (which directly follows) for the proposed Emergency Source Categories for the MCIAQCR.

Table 5-2. EMISSION REDUCTION PLAN ELEMENTS

Table 5-3. PROPOSED EMERGENCY SOURCE CATEGORIES FOR THE MCIAQCR*

ESC-I: INDUSTRIAL AND STEAM ELECTRIC POWER

- Food and Kindred Products
- Furniture and Fixtures
- Paper and Allied Products
- Printing, Publishing and Allied Industries
- Chemicals and Allied Products
- Petroleum Refining and Related Products
- Stone, Clay, Glass and Concrete Products
- Primary Metals Industries
- Fabricated Metal Products, except Ordnance, Machinery and Transportation Equipment
- Machinery, except Electrical
- Electric, Gas, and Sanitary Services (except incinerators)

ESC-II: COMMERCIAL FACILITIES

- Commercial
- Office Buildings
- High-Rises
- Hospitals
- Private and Professional Schools
- Construction

ESC-III: GOVERNMENTAL FACILITIES

- Governmental Offices
- Municipal Incinerators
- Schools
- Military Bases

ESC-IV: TRANSPORTATION AND RESIDENTIAL

- Automobiles
- Airlines
- Mass Transit
- Private Dwellings

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*See Table 5-2.

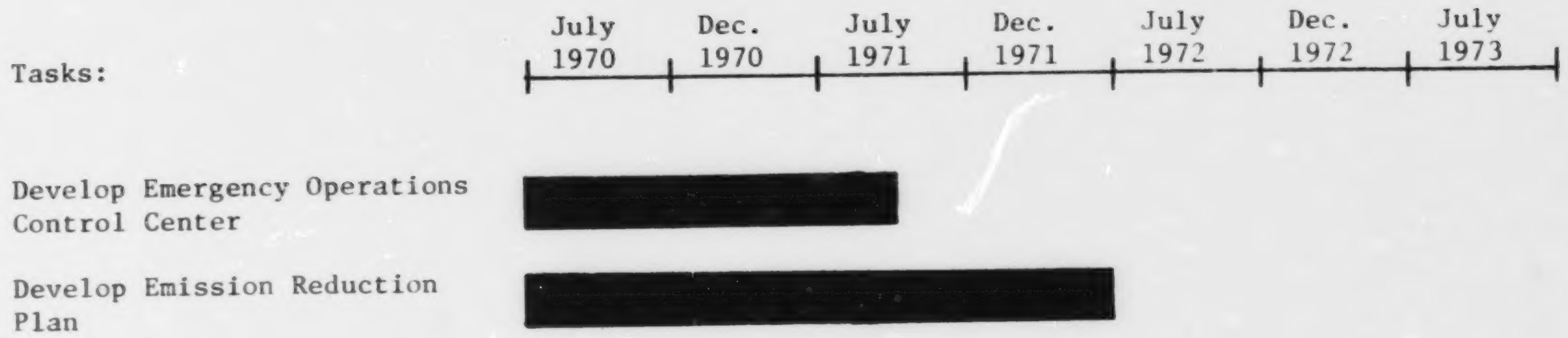

Figure 5-4. MCIAQCR EMERGENCY EPISODE PLAN TIME SCHEDULE

5.2 INTERIM EMERGENCY EPISODE PLAN

Since the comprehensive Emergency Episode Plan will not be immediately available, an interim Plan will be adopted to protect the citizens of the Region. Specific actions for source control, agency personnel, and relevant organizations have been developed for the MCIAQCR and the states in the MCIAQCR. The actions are presented in Table 5-4. The following aspects of the Emergency Episode Plan are presented for the forecast, alert, warning and emergency stages:

I. Episode Criteria
II. Intrastate Episode Authority
III. Episode Surveillance
IV. State Emission Reduction Plans
V. Episode Communications
VI. Emergency Episode Staff

The interim Emergency Episode Plan heavily depends upon voluntary compliance of major sources within the MCIAQCR. Nearly all sources are candidates for emergency control during episodes. A list of the major point sources is presented in Table 5-5. Only two sources in Kentucky have particulate or sulfur oxide emission rates equal to or greater than one ton per day. The pollutant emission rates were determined by the NAPCA emission inventory for the MCIAQCR.

The interim Plan includes the required actions to be taken by each source category at specific stages of an air pollution episode. The Plan is based on general knowledge of the source types and the ability of such sources to control emissions during episodes.

At the present time, the engineering and economic information about each source within the MCIAQCR is not available to determine scientifically the optimum strategy or series of preferred strategies. Short-term episode-meteorological diffusion models for regions are not available at this time to test the adequacy of the proposed interim Plan. Without analytical tools to evaluate the effectiveness of the Plan, a philosophy which stresses

TABLE 5-4. METROPOLITAN CINCINNATI INTERSTATE AIR QUALITY CONTROL REGION, INTERIM EMERGENCY EPISODE PLAN

Section I EPISODE CRITERIA		(F) FORECAST	(A) ALERT	(W) WARNING	(E) EMERGENCY
High Air Pollution Potential Advisory (hours)		36	None needed	None needed	None needed
Air Quality Measurements (24-hour Averages)	Particulates (COH/1000 LF)	No specified level	2.0	4.0	6.0
	Sulfur Dioxide (ppm)	No specified level	0.10	0.25	0.40

Section II INTRASTATE EPISODE AUTHORITY	(F) FORECAST	(A) ALERT	(W) WARNING	(E) EMERGENCY
Authorized State AP Official	Alert staff	Activate "alert" staff and announce "alert"	Activate "warning" staff	Activate "emergency" staff
State Governor(or AP Commissioner)	No action	No action	Announce "warning"	Announce "emergency"
State Attorney General Office	No action	No action	Assist enforcement procedures	Assist enforcement procedures

Section III EPISODE SURVEILLANCE	(F) FORECAST	(A) ALERT	(W) WARNING	(E) EMERGENCY
Air Quality Monitoring	Increase measurement frequency	Maintain hourly measurements	Maintain hourly measurements	Maintain hourly measurements
Meteorological Monitoring	Increase frequency of measurements	Maintain frequency of measurements	Maintain frequency of measurements	Maintain frequency of measurements
Data Handling	Evaluate incoming data and prepare wall charts	Evaluate incoming data and prepare wall charts	Evaluate incoming data and prepare wall charts	Evaluate incoming data and prepare wall charts
Source Surveillance	No action	Inspect major sources	Follow plan for source inspection	Follow plan for source inspection

[illegible] PLAN	(F) FORECAST	(A) ALERT	(W) WARNING	(E) EMERGENCY
[illegible]	Review emission reduction plans	Request "alert" control	Request "warning" control	Request "emergency" control
Power Generating	Inform of conditions	Substantial reduction - fuel switch or load shift	Maximum reduction - fuel switch or load shift	Maximum reduction - fuel switch or load shift
Other Fuel Burning Sources Industrial	No action	Fuel switch - limit cleaning and start-up; partial shutdown	Fuel switch - limit cleaning and start-up; partial shutdown	Maximum possible reduction
Commercial	No action	Substantial reduction	Maximum reduction	Maximum possible reduction
Processing	No action	Fuel switch, limit cleaning and start-up	Fuel switch, limit cleaning and start-up	Maximum possible reduction
Residential	No action	No action	Limit electrical consumption and reduce room temperature to 65°F	Limit electrical consumption and reduce room temperature to 65°F
Fuel Suppliers	No action	Provide assistance to customers	Provide assistance to customers	Provide assistance to customers
Incineration Municipal	Alert	Maximum reduction	Prohibit operations	Prohibit operations
Commercial	No action	Maximum reduction	Prohibit operations	Prohibit operations
Residential	No action	Prohibit operations	Prohibit operations	Prohibit operations
Open Burning	Alert	Prohibit operations	Prohibit operations	Prohibit operations
Manufacturing Continuous	No action	Minimum reduction	Maximum reduction	Maximum reduction or curtail operations
Batch Process	Alert	Minimum reduction	Partial shutdown	Curtail operations
Commercial Entertainment	No action	No action	Prepare to shut down	Shut down
Office Work	No action	No action	Prepare to shut down	Shut down
Business	No action	No action	Prepare to shut down	Shut down
Government Schools	No action	No action	Prepare to shut down	Shut down
General Office	No action	No action	Prepare to shut down non-essential activities	Shut down non-essential activities
Construction	No action	Shut down dust production activities	Prepare to shut down all activities	Shut down all activities
Motor Vehicles	No action	No action	Request non-essential travel be stopped	Prevent all but emergency travel to downtown
Public Transportation	No action	No action	No action	Provide emergency transportation

Table 5-4. (continued)

Table 5-4. (continued)

SECTION V EPISODE COMMUNICATIONS (from emergency operation control center to:)		(F) FORECAST	(A) ALERT	(W) WARNING	(E) EMERGENCY
Federal Facilities	C	Not notified	Contact through NAPCA representative	Contact through NAPCA representative	Contact through NAPCA representative
Emission Sources	S	Inform selected sources	Contact through news media and telephone	Contact through news media and telephone	Contact through news media and telephone
News Media (public)	C	Not notified	Send press release "A"	Send press release "W"	Send press release "E"
Hospitals	C	Not notified	Recommend precautionary measures	Recommend precautionary measures	Recommend precautionary measures
Police Department	S	Not notified	Alerted	Request enforcement assistance	Request enforcement assistance
Telephone Company	C	Not notified	Alerted	Request emergency procedures	Request emergency procedures
NAPCA	C	Report conditions	Report conditions	Report conditions	Request assistance
ESSA (U.S. Weather Bureau)	C	Request meteorological info.	Request meteorological info.	Request meteorological info.	Request meteorological info.
State Governor (or AP Commissioner)	S	Not notified	Report conditions	Request "Warning" Announcement	Request "emergency" announcement
State Department of Traffic & Highways	S	Not notified	Alerted	Request traffic reroute	Request traffic reroute

NOTE:
C = announcement resulting from APCO Committee dicision
S = announcement resulting from state official

Table 5-4. (continued)

SECTION VI EMERGENCY EPISODE STAFF		(F) FORECAST	(A) ALERT	(W) WARNING	(E) EMERGENCY
EOCC Director	E	Alerted	Direct staff, communicate with state officials, review public announcement	Direct staff, communicate with state official, review public announcement	Direct staff, communicate with state official, review public announcement
Chief Chemist	E	Alerted	Coordinate air quality monitoring and analysis	Coordinate air quality monitoring and analysis	Coordinate air quality monitoring and analysis
Chief Engineer (Strategist)	E	Alerted	Determine optimum source control strategy	Determine optimum source control strategy	Determine optimum source control strategy
Chief Compliance Officer	E	Alerted	Coordinate field inspections	Coordinate field inspections	Coordinate field inspections
Program Management, Chief	E	No action	Coordinate data handling effort	Coordinate data handling effort	Coordinate data handling effort
Control Engineers	S	No action	Assist sources and evaluate control status	Assist sources and evaluate control status	Assist sources and evaluate control status
Meteorologist	E	Issue local air pollution advisories	Communicate with sources of met. data, evaluate data.	Communicate with sources of met. data, evaluate data	Communicate with sources of met. data, evaluate data
Chemists	S	No action	Analyze samples	Analyze samples	Analyze samples
Technicians	S	Collect air quality samples	Collect and evaluate air quality samples	Collect and evaluate air quality samples	Collect and evaluate air quality samples
Inspectors	S	No action	Source inspections	Source inspections	Source inspections
Clerical	E	Record data and operate telephones	Record data and operate telephones	Record data and operate telephones	Record data and operate telephones
Records Analysts	E	Review emergency control data	Supply strategist with data and maintain wall charts	Supply strategist with data and maintain wall charts	Supply strategist with data and maintain wall charts
Physicians (volunteers)	E	No action	No action	Consult with Director	Consult with Director
Communication Specialists	E	No action	Prepare special press releases	Prepare special press releases	Prepare special press releases
State Police Department	S	No action	Review enforcement procedures	Assist with enforcement	Assist with enforcement

NOTE:
S = denotes state activity
E = denotes EOCC activity

Table 5-5. MAJOR POINT SOURCES IN THE MCIAQCR

Source	Sulfur Oxides (tons/year)	Particulates (tons/year)
KENTUCKY		
Covington Dump	0.04	1.45
Interlake Steel Corp.	---	18.21

the protection of the health of the citizens has been taken. Thus, a relatively stringent plan is recommended. When meteorological tools are developed and are practical for a region the size of the MCIAQCR, such will be incorporated into the comprehensive Emergency Episode Plan.

A selective emergency emission reduction strategy may be used when an episode is discovered in one localized area. The most efficient and economical strategy in such a case will be the emergency control of nearby sources that, because of wind direction, are directly affecting the episode.

Whenever possible, sources in similar source categories will be treated equally. The factors of: (1) effectiveness of temporary control, (2) the required response time for emergency control, and (3) economic impact on the source will all be considered when determining the interim ERP, when such factors are known.

Although the interim ERP will be based on voluntary compliance of major point sources, temporary injunctive relief can be requested through local courts when sources will not voluntarily comply with control orders.

Until the recommended air quality monitoring network is operational for Kentucky, the existing network will satisfy the need for episode air quality determination.

Meteorological information will be obtained from the U.S. Weather Bureau. Additional meteorological information, if needed, will be obtained through private sources.

6. AIR QUALITY MONITORING

6.1 OBJECTIVES

Ambient air sampling is required to assess current air quality, determine the degree of improvement necessary and measure the results of control and abatement actions. A second major requirement is for the provision of intelligence prior to, during, and following actual or potential air pollution episodes in order to determine emission curtailment tactics for episodal avoidance.

Requirements are divided into two categories, based on desired averaging times:

- Contaminant concentration on a schedule; intermittent hourly/daily basis
- Continuous real-time monitoring providing 15-minute average concentrations and running averages of one hour, eight hours, and 24 hours

Based on these criteria, two types of air quality monitoring sites are required. These are designated as primary and secondary monitoring stations.

The following are the pollutants of immediate concern, the techniques for monitoring, the type of equipment needed, averaging time, and data summary report period for primary and secondary monitoring sites.

Primary Monitoring Station

Pollutant	Monitoring Technique	Sensor	Averaging Time	Report Period
Sulfur Dioxide	Colorimetric or Coulometric	Continuous	Hourly	Monthly
Particulates	Filtration (Suspended)	Intermittent	24-Hour	Quarterly
	Filtration (Soiling)	Continuous	2-Hour*	Monthly
Wind Speed**	Anemometer	Continuous	Hourly	Monthly
Wind Direction**	Wind-Vane	Continuous	Hourly	Monthly

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*One-Hour averaging during episodes

**Taken at several selected sites (to be determined)

Secondary Monitoring Station

Pollutant	Monitoring Technique	Sensor	Averaging Time	Report Period
Sulfur Dioxide	Colorimetric	Intermittent (daily, 24 samples)	Hourly	Monthly
Particulates	Filtration (Suspended)	Intermittent	24-Hour	Quarterly

6.1.1 Location of Sampling Stations

Air quality monitoring sites represent pollutant density in their immediate area (normally within a radius of 1/2 - 3/4 mile around the site), are directly influenced by the proximity of emission sources (emission density), and monitor the impact of pollutants on people working of living in their immediate area (dosage). Therefore, each projected station has been evaluated according to these three considerations as follows:

- Pollution Density*

  Based on real and simulated pollutant averages, annual levels of suspended particulates and sulfur oxides were plotted according to multiple concentration ranges. These were classified as values greater than, equal to, and less than approved Air Quality Standards.

- Population Density*

  Based on 1968 data, population density was plotted by three categories: high, median, and low.

- Emission Density*

  Based on emissions inventory data (1969) compiled for this report for suspended particulates and sulfur oxides, annual emission densities were plotted. These are representative of high, median, and low levels of source concentrations.

Table 6-1 presents the projected regional air quality monitoring network. Each site is described by category and evaluated according to the above noted criteria. Its location in the AQCR is fixed and its actual or scheduled start-up is listed. The numbers and general locations of sampling sites were selected to represent the best judgment regarding the allocation of resources necessary to meet the previously stated surveillance objectives.

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*Maps showing the pollutant concentrations, population density, and emission density are presented in Section 1 and were used in determining sampler placement.

TABLE 6-1. PROJECTED REGIONAL AIR QUALITY MONITORING NETWORK

Station Type	Pollution Density			Population Density			Emission Density			Location	Start-Up Date
	H	M	L	H	M	L	H	M	L		
o Primary	X			X			X			Central and Ann Streets, Cincinnati, Ohio	Jan., 1962
o Primary	X			X			X			Drake Hospital Galbraith Road Cincinnati. Ohio	Jan., 1971
o Primary		X		X				X		Main and Dayton Streets, Hamilton, Ohio	April, 1971
o Primary	X			X			X			600 5th Street Newport, Kentucky	Jan., 1971
o Secondary	X			X			X			1055 Laidlaw Avenue Cincinnati, Ohio	Jan., 1968
o Secondary	X			X			X			General Protestant Orphanage, Madison Road, Cincinnati,Ohio	April, 1971
o Secondary		X		X				X		Parkland & Twain Saylor Park Cincinnati, Ohio	July, 1971
o Secondary			X		X				X	800 Bauer Ave.-B.H.S. Batavia, Ohio	July, 1971
o Secondary	X			X				X		Galbraith & Blue Ash Deer Park, Ohio	July, 1971
o Secondary	X				X		X			E. 4th St. - F.H.S. Franklin, Ohio	Jan., 1971
o Secondary		X		X					X	Sharon & Winton Roads Greenhills, Ohio	July, 1971
o Secondary		X			X			X		230 S. Elm Street Harrison, Ohio	Jan., 1971
o Secondary			X		X				X	25 Oakwood Avenue Lebanon, Ohio	Jan., 1971

TABLE 6-1 Continued:

Station Type	Pollution Density			Population Density			Emission Density			Location	Start-Up Date
	H	M	L	H	M	L	H	M	L		
o Secondary		X				X		X		State & Hill Streets Miamitown, Ohio	Jan., 1971
o Secondary	X			X			X			1240 Central Avenue Middletown, Ohio	April, 1971
o Secondary		X			X		X			N.R. Fire Dept., Market Street New Richmond, Ohio	July, 1971
o Secondary	X					X			X	U.S. 50 & St. Rt. 128 North Bend, Ohio	July, 1971
o Secondary			X		X				X	Talawanda High School Chestnut Street Oxford, Ohio	Jan., 1971
o Secondary	X				X		X			Short & E. Williams Lawrenceburg, Indiana	Jan., 1970
o Secondary			X			X	X			State Route 56 Rising Sun, Indiana	Jan., 1971
o Secondary	X			X			X			7th and Scott Street Covington, Kentucky	Jan., 1968
o Secondary		X		X				X		505 Commonwealth Ave. Erlanger, Kentucky	Jan., 1967
o Secondary		X			X				X	Veterans Hospital Ft. Thomas, Kentucky	Jan., 1971
o Secondary		X			X		X			Rt. 20 Petersburg, Kentucky	July, 1971
o Secondary			X		X				X	U.S. 25 & Stevenson Road Walton, Kentucky	Jan., 1971

Figure 6-1 graphically displays the network configuration. Superimposed on the display of sampling location is an isopleth projection of predicted annual arithmetic average particulate concentrations. (See Section 2.2.) This display indicates that areas of maximum pollutant concentrations will be adequately sampled by the proposed network.

6.1.2 Frequency of Collection

Data will be collected on a continuous basis from all automatic SO_2 analyzers utilized. Sequential samplers will measure SO_2 for 24 consecutive one-hour periods every third calendar day.

Twenty-four hour concentrations of suspended particulates will be collected on all hi-vol samplers utilized every third calendar day.

Soiling particulates will be collected continuously at two-hour intervals at all primary monitoring stations.

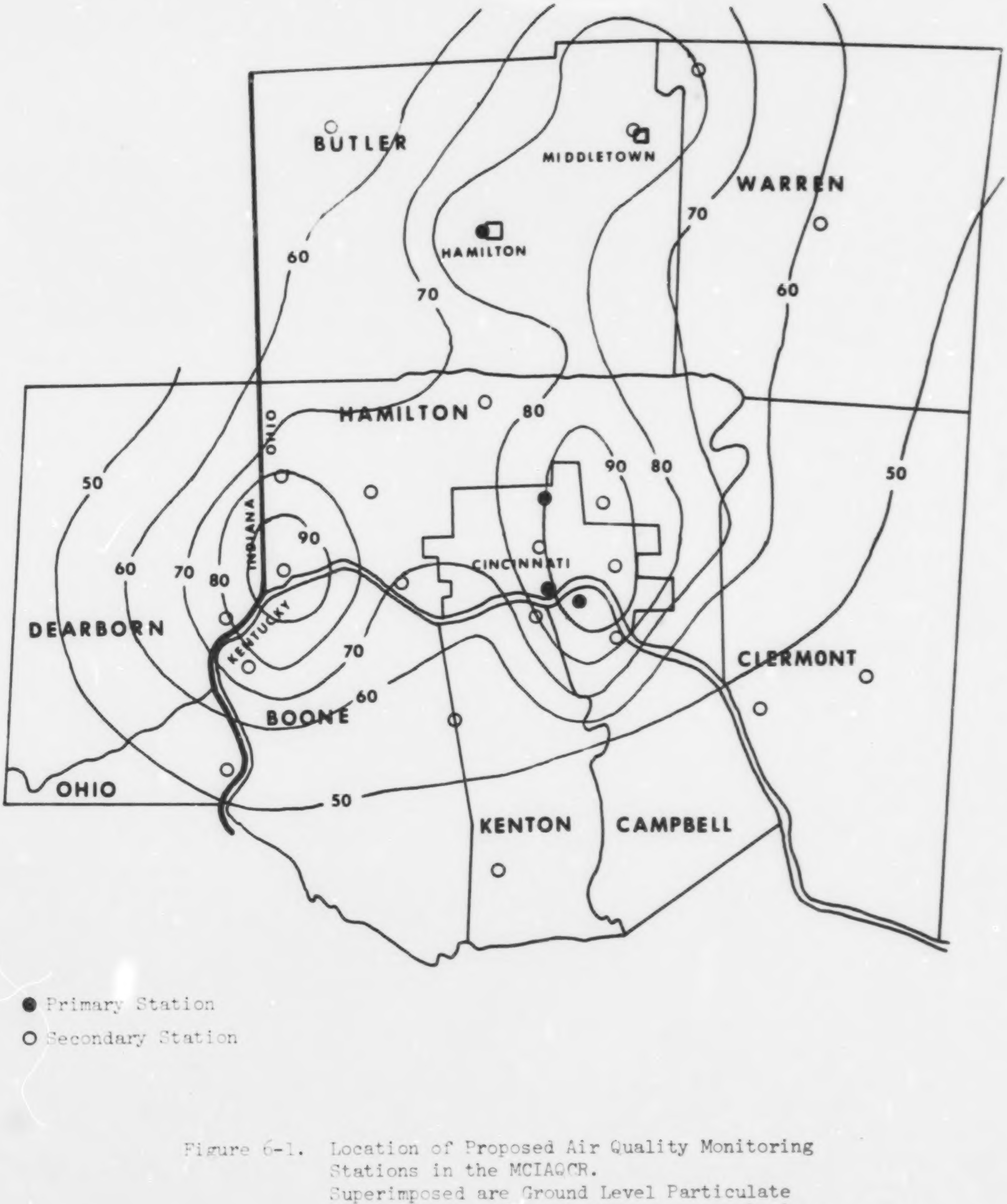
6.1.3 Methods of Sampling

Prescribed methods of measuring and monitoring atmospheric sulfur oxides are referenced from Public Health Service Publication No. 999-AP-6 (1964). The methods for atmospheric sampling and analyses of suspended particulate matter are referenced from the APCA Recommended Standard Method, APM-2.5 (1967). The methods for atmospheric sampling and analysis of soiling particulate matter are referenced from the APCA Recommended Standard Method, APM-2.1 (1963).

6.1.4 Data Handling and Analysis

6.1.4.1 Suspended Particulates

Following the 24-hour sample collection period, filters from the high volume samplers are sent to the Air Pollution Control Commission Analytical Laboratory in Frankfort. A laboratory technician determines the concentration of particulates and records the value and the appropriate identification information on data record forms. Routine monthly and annual reports as well as specialized data analyses are prepared manually. Consideration is now being given to the development of a computerized data



● Primary Station

○ Secondary Station

Figure 6-1. Location of Proposed Air Quality Monitoring Stations in the MCIAQCR. Superimposed are Ground Level Particulate Isopleth Concentrations (See Section 4.2). (Concentrations shown represent annual arithmetic mean values in $\mu g/m^3$.)

handling system. Such a system would, of course, be designed to handle data from any air monitoring activities conducted by the Commission. This system will process all types of ambient air quality measurements and could be operational by July 1971.

6.1.4.2 Soiling Index

Sampling to determine soiling is done on a two-hour basis during periods of normal operation. Measurements of light transmission through the filter paper are made at the beginning and end of the sampling period. Results are recorded on a strip chart. At weekly intervals the strip charts are forwarded to the laboratory in Frankfort, where a technician performs the necessary computation and records the soiling index in COHS/1000 linear feet on the appropriate data record form. At monthly and annual intervals, routine reports are prepared manually. Specialized data analyses are also done manually. If a decision is made to develop a computerized data handling system, measurements of soiling will also be handled by automated techniques.

6.1.4.3 Sulfur Dioxide

Continuous sampling measurements of sulfur dioxide concentrations are made at one station located in Newport. Results are recorded on a strip chart. At weekly intervals the strip charts are forwarded to the laboratory in Frankfort, where a technician manually reduces the data. Individual one-hour average concentrations are entered on data record forms. Monthly and annual reports and special data analyses are prepared manually. When practicable, the strip chart recorder will be replaced by a magnetic tape recorder, which in turn will be computer processed at weekly intervals. This system will necessitate the development of a computerized data handling system.

6.1.4.4 Sequential Samplers

The sequential sulfur dioxide samplers will yield 24 one-hour samples. These samples are returned to the laboratory for analysis. Presently all data handling including the preparation of monthly and annual reports and special data analyses is done manually.

When and if a computerized data handling system is developed for the air monitoring activities conducted statewide by the Commission, data from the sequential samplers will also be handled by automated techniques.

6.1.4.5 Episode Sampling

During episode situations,the four primary monitoring stations will provide the real-time information necessary for effective, timely control actions. As these stations are installed, the data transmission system described in Section 6.4 will provide a link to the continuous pollutant analyzers. Also, during periods of high air pollution potential, the sampling interval for the spot samplers will be reduced to one hour. These instruments may be read directly at the sampling site; or, alternatively, a system is currently being investigated which would permit interrogation via data phone from the central control station (EOCC, Section 5).

While emphasis during an episode will be on the rapid collection and evaluation of data from the primary monitoring systems, certain secondary stations will be used for defining the geographical limits of severe pollutant concentrations. Technical Service personnel from all three state agencies, under the direction of the Episode Control Officer, will man selected secondary stations. Through the use of a central laboratory facility, results from these stations can be made available with minimum delay (four hours after sampling).

6.2 CONTROL OF EMISSION SOURCES

This function of the total air pollution control effort encompasses both Engineering and Enforcement services personnel. It includes two separate systems, each system being made up of two programs as follows:

- Source Surveillance
  - (a). Source Identification and Registration
  - (b). Permit to Construct
  - (c). Permit to Operate
- Source Inspection - Field Operations
  - (a). Fuel Burning Sources, Industrial Sources
  - (b). Complaint Investigations and Field Patrol

6.2.1 Source Surveillance

All new or existing control apparatus and/or appropriate equipment used within the Region will be required to obtain a Permit to Construct and/or a Permit to Operate. This mechanism will guarantee source identification and registration. The following apparatus and equipment will be required to obtain Permits:

- All control apparatus
- Equipment used in a manufacturing process involving surface coating, including but not limited to spray and dip painting, roller coating, electrostatic depositing or spray cleaning which emits air contaminants into the open air and in which the quantity of material used in any source operation is in excess of 10 pounds in any one hour.
- Equipment used in a manufacturing process involving metal cleaning or surface preparation, including but not limited to degreasing, etching, pickling, or plating which emits air contaminants into the open air from a tank or vessel, the capacity of which is in excess of 100 gallons.
- Equipment, used in a manufacturing process, with some exceptions to be defined, which emits air contaminants into the open air either directly or indirectly and in which the combined weight of all materials, excluding air and water, introduced into any one source operation is in excess of 50 pounds in any one hour.
- Liquid storage tanks, reservoirs, and containers, used for the storage of acids, solvents, diluents or thinners, inks, colorants, lacquers, enamels, varnishes, liquid resins and having a capacity in excess of 10,000 gallons.
- Pneumatic material handling or conveying systems.

- Commercial fuel burning equipment in which the rate of solid fuel burned is in excess of 1,000,000 BTU's in any one hour.
- Any equipment used for the burning or incineration of non-commercial fuel or process by-products in the form of liquid, solid, or gas.
- Any incinerator, except incinerators constructed, installed, or used in one or two family dwellings or in multi-occupied dwellings containing six or less family units, one of which is owner occupied.

Prior to issuance of a Permit to Operate, an engineer will observe the equipment in operation at design capacity. At that time, the equipment will be checked with the plans and specifications previously submitted. During the inspection, observations will be made to determine that:

- the equipment is physically located as shown on the equipment location drawing,
- the equipment is constructed as indicated in the application,
- the equipment is capable of operating in compliance with the applicable rules and regulations of the State Air Pollution Control Agency,
- source testing is or is not necessary.

Based on the engineers' inspection and evaluation of the equipment and process as well as relevant source test results, a recommendation will be made by the engineer regarding the issuance or denial of permit to operate. After review and approval of the recommendation, action will be taken by the State Agency to approve or deny the Permit to Operate.

Source testing capability to support the Permit to Operate program currently exists in the Cincinnati Agency, for the Ohio Program. It will be developed or expanded in the Kentucky and Indiana state agencies. This capability will consist of trained personnel (normally a two-man team) and equipment for determining particulates, sulfur oxides, and other gaseous emissions.

A person desiring to construct or alter and operate any equipment capable of emitting air contaminants will be required to apply for a Permit to Construct from the appropriate air pollution control agency. The agency will furnish application forms, written instructions, and information required for proper filing. The application will be logged, dated, and assigned an identification number. All information pertinent to the application, including data and drawings, will be submitted to an air pollution control engineer for review and evaluation. Based on the engineer's review, the application will be approved and the applicant may proceed with construction, or the applicant will be requested to confer with the engineer to discuss questionable aspects of the application. In the event that disagreements cannot be resolved by submission of additional information, minor changes in the proposals, or an acceptable explanation by the applicant, the application will be denied.

This mechanism will be installed and operated by the Necessary emissions inventory data will be abstracted at the local level by the State Agencies for entry into the Regional Data Bank. The State will reserve the right to negate Permits to Operate issued to sources which are found in violation of State regulations.

6.2.2 Source Inspections - Field Operations

Equipment installed, placed in operation, and issued a Permit to Operate will then come under the jurisdiction of Enforcement Services personnel. This group is responsible for policing sources of air pollution within its area of jurisdiction to insure compliance with applicable rules and regulations of the agency.

Each Enforcement Unit will encompass the following functional activities:

Industrial Inspections

- Continuously inspect assigned manufacturing plants
- Prepare source inventories
- Check compliance with permit system and conditions of variances in assigned industries
- Investigate breakdowns
- Investigate complaints made against assigned industries

Field Patrols

- Patrol assigned zones including highways and waterways for all visible violations from stationary and mobile sources
- Enter and cite all plants where visible violations are observed
- Keep under surveillance plants on referral from other sections
- Answer public complaints

Communications

- Maintain and operate radio transmitter and receiver 24 hours a day for:
  a. Complaints, instructions, and data to mobile units
  b. Declaration of alerts to specified industries and all mobile units
  c. Receipt and recording of data from air monitoring stations

6.2.3 Schedule

The Source Surveillance System will be completely implemented and operational by January 1973.

The Field Operations and Inspection Systems will be operational by January 1972.

6.3 REGIONAL DATA BANK

A regional data bank will be established and maintained by the City of Cincinnati agency. In order to maximize the utility of collected data in planning and decision making, a total data management system will be developed. Following is a brief summary of the elements of such a system and an estimate of the monthly computer time.

- Air Quality and Meteorological data (Operational by July 1971).

It will be necessary to develop a series of ten computer programs to handle the routine processing of air quality and meteorological data. The air quality monitoring system will yield in excess of 50,000 measurements each month. It will be necessary to convert these data to engineering units, validate the data, update master files, and prepare routine data tabulations and statistical summaries. The monthly computer usage will be ten hours.

These programs will provide a continuing evaluation of the progress toward the attainment of air quality standards. In addition, the programs will provide frequency distributions of pollutant concentrations, relationships among air quality and meteorological parameters, geographical distribution of pollutants, and the like. The monthly computer usage will here be six hours. Approximately two hours per month of an x - y plotter will be utilized.

- Emission Inventory (Operational by January 1971)

The data bank will maintain a current inventory of all sources of air pollution. Such data is necessary to show progress being made in the reduction of total emissions to the atmosphere. A series of 4-6 computer programs will be developed to handle this data; the actual update of the inventory will result from the data collected through the operation of the Permit System. File update will require four hours of computer time per month.

- Permit System (Operational by January 1971)

To maintain control of sources of air pollutants, a permit system will be established. Administration of this system will require a series of 3-4 computer programs. Monthly computer time required will be four hours per month.

- Diffusion Modeling (Operational by January 1972)

In order to assess the adequacy of emission regulations, it is necessary to supplement measurements of air quality with estimates of air quality derived from a mathematical model of atmospheric diffusion. Computer programs are available from NAPCA. Minor modifications will be made to adapt these programs to the RCA Computer. Diffusion modeling will be performed on an annual basis and will require 20 hours per year.

6.4 AIR QUALITY DATA TRANSMISSION

Routinely, data from the continuous analyzers will be manually reduced, punched on input cards, and stored in the computer. No extensive telemetry system will be initially employed.

However, a telephone interrogation system for the automatic monitors at all primary sampling stations will be installed as the stations are activated. This system will consist of a telephone, data processing set, and a teletype printer located at the control center (Cincinnati Air Pollution Control Agency). A data transmission set and a computer-serializer unit will be located at each remote site. A command from the control center, generated by dialing the unlisted phone of the field station, will signal the data transmission set which then activates the computer-serializer unit. This unit takes a millivolt signal from the appropriate automated monitor and converts it to a signal compatible with the Bell System transmissions equipment. At this point, the transmission set sends a signal over the Bell System's lines to the central control station. The signal is then processed and displayed by means of a teletype printer. After processing sequentially through the available field monitors, the computer-serializer generates a disconnect pulse for the completion of the sequence.

The major objectives of this system are:

- Routine interrogation of field stations to establish the priority of maintenance requirements. A more efficient utilization of the instrument technician will be achieved, thus resulting in the overall reduction of manpower needs.
- Frequent interrogation during emergency episode periods to provide the EAC with a link to "real-time" data.

7. RESOURCES

7.1 GENERAL

The enactment of enabling legislation and the adoption of emission control regulations will not of themselves accomplish the air quality goals set forth in this Implementation Plan. Realization of these goals depends to a great extent upon the ability of the control agencies to enforce abatement programs. Such enforcement, in turn, is contingent upon the availability of adequate resources, the most crucial being manpower.

In the determination of manpower requirements, the NAPCA model was used. Briefly, this model uses four area characteristics (land area, population, number of manufacturing establishments, and capital expenditures) to estimate man years of effort required to support some fourteen functions carried out by a control agency.

The organizational structure of the various control agencies within the MCIAQCR is an important factor in determining the required resources. An analysis of the various organizational alternatives considered in the preparation of this Implementation Plan is presented in Appendix C. Consideration was given to the structure of intrastate control agency operations as well as to possible areas of interstate cooperation.

The following two sections present the control agency requirements for the Kentucky portion of the MCIAQCR as determined by the manpower model. All funds will be provided by the state, with matching federal funds and all personnel will be hired by the Kentucky State Agency.

7.2 CALCULATED MAN-YEARS

Area characteristics for each county are presented in Table 7-1. Because the allocation of resources between the State and local agencies have not been determined, the manpower model was used to estimate man-years of effort required in the Kentucky portion of MCIAQCR. A summary of the output from the manpower model is presented in Table 7-2. A total of 17.4 man-years of effort is required to sustain an adequate control program for the three county area.

TABLE 7-1. INPUT CHARACTERISTICS OF KENTUCKY NEEDED FOR MANPOWER ESTIMATES

County(ies)	Area (Sq. Miles)	Population (1970 est.)	Manufacturing Establishments	Capital Expenditures ($)
Kentucky				
Boone	249	30.8×10^3	12	0.1×10^6
Kenton	165	134.5×10^3	102	1.6×10^6
Cambell	149	95.0×10^3	66	1.4×10^6
Total	563	260.3×10^3	180	3.1×10^6
Region Total	2707	1.735×10^6	2172	94.6×10^6

TABLE 7-2 . SUMMARY OF MAN-YEAR ESTIMATES FOR KENTUCKY PORTION OF MCIAQCR

FUNCTION	PREDICTOR	MANPOWER FACTOR	CALCULATED MAN-YEARS
1. Monitoring			
Primary	1	0.5	(0.5)
Secondary	7	0.2	(1.4)
Total			1.9
2. Inspections	0.180	2.8	0.5
3. Complaints	4.4	1.0	4.4
4. Permits	0.03	9.7	0.3
5. Policy	7.1	0.22	1.6
6. Training	7.1	0.12	0.9
7. Special Studies	7.1	0.06	0.5
8. Emission Estimates	7.1	0.05	0.4
9. Eng. Reports	7.1	0.06	0.5
10. Administration	7.1	0.59	4.2
11. Data Processing	7.1	0.09	0.6
12. Source Testing	0.8	0.10	0.1
13. Instrumentation	2.4	0.25	0.6
14. Laboratory	2.5	0.35	0.9
Total			17.4

TABLE 7-3 . ESTIMATED PRESENT MANPOWER UTILIZATION BY CONTROL AGENCY FOR KENTUCKY AND FOR THE TOTAL MCIAQCR.

CONTROL PROGRAM	STATE AGENCY KENTUCKY	REGIONAL TOTALS
Management		
Policy	0.5	2.6
Training	0.5	1.6
Administrative	0.5	4.8
Sub-Total	1.5	9.0
Enforcement		
Inspections	0.3	1.4
Complaints	0.2	4.3
Source Registration	0	1.1
Sub-Total	0.5	6.8
Engineering		
Permits	0.1	0.2
Emission Est.	0.3	2.3
Source Test.	0.1	1.1
Reports; Reg.	0	0.0
Sub-Total	0.5	3.6
Technical Services		
Monitoring	0.2	1.0
Special Studies	0	0.0
Data Processing	0	0.0

TABLE 7-3 . Continued

Instrumentation	0	0.0
Laboratory	0.2	1.0
Sub-Total	0	2.0
Totals	2.5	21.4

TABLE 7-4 . SUMMARY OF ESTIMATED MAN-YEARS FOR KENTUCKY PORTION OF THE MCIAQCR

Control Program	Kentucky			Regional Total		
	FY 71	72	73	71	72	73
Enforcement						
Scheduled Inspection	0.5	0.5	0.5	5.6	6.1	6.1
Complaints, Field Patrol	4.0	4.4	4.4	12.3	14.7	16.8
Sub-Total*	4.5	5.0	5.0	18.0	21.0	23.0
Engineering Services						
Permit System	0.3	0.3	0.3	3.5	5.5	9.1
Emission Estimates	0.4	0.4	0.4	2.0	2.0	2.2
Source Testing	0.1	0.1	0.1	1.4	1.6	1.6
Reports, New Leg., etc.	0.5	0.5	0.5	1.6	2.6	2.6
Sub-Total*	1.5	1.5	1.5	8.5	12.0	15.5
Technical Services						
Monitoring Network	1.5	1.9	1.9	6.0	8.4	10.4
Special Studies	0.5	0.5	0.5	1.1	1.6	2.6
Instrument Calibration	0.5	0.5	0.6	2.1	2.7	3.3
Laboratory	0.5	0.5	0.9	2.6	3.7	5.2
Data Processing	0.5	0.5	0.6	2.6	3.6	3.8
Sub-Total*	3.5	4.0	4.5	14.5	20.0	25.5

TABLE 7-4 . Continued

Management Services						
Policy, Strategies, etc.	1.0	1.5	1.6	5.1	7.7	9.4
Staff Training	0.5	0.7	0.9	2.6	3.9	5.2
Administration-Clerical	3.5	3.8	4.2	16.0	20.3	25.0
Legal Counsel	1.0	1.0	1.0	2.5	2.5	3.0
Sub-Total*	6.0	7.0	7.5	26.0	34.5	42.0
OVERALL TOTALS**	16.	18.	19.	68.	89.	107.

Note:

* Rounded-off to nearest half-man year
** Rounded-off to nearest whole-man year

7.3 FUNDING

The funding required to support the Kentucky Control Agency in the MCIAQCR is projected upon the basis of the staffing presented in Table 7-4. Salaries for the various categories of personnel are based upon information contained in the NAPCA Program and Financial Needs Report for the MICAQCR (Table 7-5). Salaries are burdened by an overhead factor equivalent to one third of the base salary, overhead includes such things as: fringe benefits, facilities and support, and additional operating expenses (travel, utilities, consumables, etc.).

A summary of costs for three years beginning with FY 1971 are presented in Table 7-6. The goal is to reach the required level of operation by FY 1973 when it is estimated that in excess of $250 thousand will be necessary. This represents about a three-fold increase over the existing level of funding.

The sources of revenue which will produce the projected level of funding are uncertain as of the writing of this report. It is assumed that basic program support will remain at the state level. Furthermore, it is assumed that present federal grants will be extended and two for one matching funds will be provided for new monies put forth by local or state jurisdictions.

A summary of the capital expenditures necessary to support air monitoring activities over the period FY 1971 to FY 1973 is presented in Table 7-7. The total is included in the costs distributed over the three fiscal years in Table 7-6.

TABLE 7-5 . AVERAGE SALARY ESTIMATES FOR AGENCY OPERATIONS

	Annual
Management Activities	
Professional (25%)	$ 16,000
Non-Professional (75%)	8,000
Enforcement Activities	
Inspectors	10,000
Engineering Activities	
Engineers	14,000
Technical Services	
Chemists (40%)	10,000
Technicians (60%)	5,000
Fringe Benefits, Facilities and Support, plus Additional Operating Expenses	33 1/3 % of Base Salary

TABLE 7-6 . ESTIMATED BUDGET FOR KENTUCKY PORTION OF MCIAQCR

	Fy 71	72	73
Management Operation			
Salaries	59,000	61,350	62,850
Operating Expense	21,000	22,000	22,500
Facilities and support	1,200	1,000	1,000
	82,200	84,350	86,350
Enforcement Operations			
Salaries	39,000	40,500	42,000
Operating Expense	15,500	16,000	16,400
Facilities and support	600	700	800
	55,100	57,200	59,200
Engineering Operations			
Salaries	29,000	32,600	34,100
Operating Expense	9,700	11,700	12,200
Facilities and support	1,000	1,000	1,000
	39,700	45,300	47,300
Technical Service Operations			
Salaries	20,000	22,500	27,500
Operating Expense	6,000	7,500	10,300
Facilities and support	31,800	25,000	20,000
	57,800	55,000	57,800
Total Expenditures for Agency	234,800	241,850	250,650
Total Expenditures for Region	1,043,400	1,230,350	1,472,450

TABLE 7-7 . ESTIMATED CAPITAL EXPENDITURES FOR THE KENTUCKY PROGRAM WITHIN THE MCIAQCR

Through Fiscal Year 1973

ITEM	KENTUCKY	REGIONAL TOTALS
Air Monitoring Network		
Continuous Station	\$18,000 (1)	\$72,000 (4)
Shelter	12,000	48,000
Cont. SO_2 (Recorder)	4,000	16,000
Tape Sampler	1,000	4,000
Hi-Vol Sampler	300	1,200
SO_2 Bubblers	700	2,800
Intermittent Station	\$ 1,100 (5)	\$23,400 (21)
Hi-Vol Sampler	1,500	6,300
SO_2 Bubblers	3,200	15,700
Misc. Static	200	1,000
Laboratory Equipment	\$20,000	\$50,000
Computer Facilities (Time Sharing)	2,000	5,000
TOTALS	\$67,800	\$244,000

APPENDIX A

TABLE A-1

METEOROLOGICAL INPUT DATA FOR THE ANNUAL SEASON

Stability Class 1

	WINDSPEED CLASS					
WIND DIRECTION	1	2	3	4	5	6
N	0.0001	0.0001	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0002	0.0001	0.0	0.0	0.0	0.0
E	0.0001	0.0002	0.0	0.0	0.0	0.0
ESE	0.0001	0.0003	0.0	0.0	0.0	0.0
SE	0.0001	0.0003	0.0	0.0	0.0	0.0
SSE	0.0000	0.0001	0.0	0.0	0.0	0.0
S	0.0001	0.0003	0.0	0.0	0.0	0.0
SSW	0.0001	0.0002	0.0	0.0	0.0	0.0
SW	0.0001	0.0001	0.0	0.0	0.0	0.0
WSW	0.0001	0.0002	0.0	0.0	0.0	0.0
W	0.0002	0.0002	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0001	0.0001	0.0	0.0	0.0	0.0
NNW	0.0001	0.0002	0.0	0.0	0.0	0.0

TABLE A-1 (Continued)

METEOROLOGICAL INPUT DATA FOR THE ANNUAL SEASON

Stability Class 2

	WINDSPEED CLASS					
WIND DIRECTION	1	2	3	4	5	6
N	0.0009	0.0016	0.0006	0.0	0.0	0.0
NNE	0.0007	0.0010	0.0008	0.0	0.0	0.0
NE	0.0012	0.0020	0.0008	0.0	0.0	0.0
ENE	0.0007	0.0012	0.0014	0.0	0.0	0.0
E	0.0007	0.0025	0.0015	0.0	0.0	0.0
ESE	0.0002	0.0012	0.0010	0.0	0.0	0.0
SE	0.0004	0.0013	0.0006	0.0	0.0	0.0
SSE	0.0010	0.0013	0.0006	0.0	0.0	0.0
S	0.0020	0.0021	0.0010	0.0	0.0	0.0
SSW	0.0013	0.0020	0.0012	0.0	0.0	0.0
SW	0.0010	0.0021	0.0010	0.0	0.0	0.0
WSW	0.0008	0.0028	0.0018	0.0	0.0	0.0
W	0.0009	0.0020	0.0014	0.0	0.0	0.0
WNW	0.006	0.0010	0.0011	0.0	0.0	0.0
NW	0.0005	0.0010	0.0007	0.0	0.0	0.0
NNW	0.0003	0.0012	0.0009	0.0	0.0	0.0

TABLE A-1 (Continued)

METEOROLOGICAL INPUT DATA FOR THE ANNUAL SEASON

Stability Class 3

WIND DIRECTION	WINDSPEED CLASS					
	1	2	3	4	5	6
N	0.0005	0.0012	0.0041	0.0007	0.0001	0.0
NNE	0.0003	0.0014	0.0019	0.0003	0.0	0.0
NE	0.0005	0.0012	0.0031	0.0003	0.0	0.0
ENE	0.0006	0.0009	0.0032	0.0005	0.0	0.0
E	0.0005	0.0017	0.0030	0.0010	0.0	0.0
ESE	0.0002	0.0010	0.0025	0.0003	0.0	0.0
SE	0.0003	0.0016	0.0016	0.0001	0.0	0.0
SSE	0.0003	0.0010	0.0017	0.0001	0.0	0.0
S	0.0010	0.0025	0.0039	0.0006	0.0	0.0
SSW	0.0013	0.0036	0.0052	0.0010	0.0	0.0
SW	0.0009	0.0028	0.0072	0.0016	0.0002	0.0
WSW	0.0007	0.0022	0.0073	0.0012	0.0001	0.0
W	0.0005	0.0022	0.0076	0.0013	0.0001	0.0001
WNW	0.0002	0.0006	0.0039	0.0008	0.0	0.0001
NW	0.0002	0.0010	0.0023	0.0001	0.0	0.0
NNW	0.0002	0.0008	0.0016	0.0002	0.0	0.0

TABLE A-1 (Continued)

METEOROLOGICAL INPUT DATA FOR THE ANNUAL SEASON

Stability Class 4

	WINDSPEED CLASS					
WIND DIRECTION	1	2	3	4	5	6
N	0.0004	0.0051	0.0138	0.0134	0.0009	0.0002
NNE	0.0003	0.0035	0.0089	0.0070	0.0005	0.0001
NE	0.0004	0.0054	0.0101	0.0065	0.0002	0.0001
ENE	0.0006	0.0050	0.0114	0.0058	0.0003	0.0
E	0.0005	0.0062	0.0127	0.0056	0.0002	0.0
ESE	0.0004	0.0051	0.0082	0.0039	0.0003	0.0001
SE	0.0004	0.0044	0.0099	0.0028	0.0001	0.0001
SSE	0.0011	0.0043	0.0091	0.0036	0.0001	0.0
S	0.0016	0.0103	0.0210	0.0119	0.0008	0.0001
SSW	0.0012	0.0077	0.0211	0.0186	0.0028	0.0003
SW	0.0008	0.0074	0.0196	0.0244	0.0039	0.0010
WSW	0.0010	0.0071	0.0156	0.0184	0.0029	0.0008
W	0.0009	0.0076	0.0177	0.0262	0.0052	0.0012
WNW	0.0010	0.0041	0.0130	0.0193	0.0036	0.0001
NW	0.0008	0.0047	0.0089	0.0138	0.0010	0.0001
NNW	0.0002	0.0033	0.0061	0.0070	0.0005	0.0001

TABLE A-1 (Continued)

METEOROLOGICAL INPUT DATA FOR THE ANNUAL ASEASON

Stability Class 5

WIND DIRECTION	WINDSPEED CLASS 1	2	3	4	5	6
N	0.0023	0.0067	0.0046	0.0	0.0	0.0
NNE	0.0033	0.0079	0.0030	0.0	0.0	0.0
NE	0.0034	0.0088	0.0030	0.0	0.0	0.0
ENE	0.0039	0.0107	0.0045	0.0	0.0	0.0
E	0.0058	0.0114	0.0043	0.0	0.0	0.0
ESE	0.0055	0.0098	0.0016	0.0	0.0	0.0
SE	0.0047	0.0088	0.0011	0.0	0.0	0.0
SSE	0.0045	0.0092	0.0017	0.0	0.0	0.0
S	0.0148	0.0215	0.0039	0.0	0.0	0.0
SSW	0.0131	0.0261	0.0039	0.0	0.0	0.0
SW	0.0102	0.0166	0.0060	0.0	0.0	0.0
WSW	0.0035	0.0078	0.0041	0.0	0.0	0.0
W	0.0029	0.0089	0.0063	0.0	0.0	0.0
WNW	0.0021	0.0047	0.0035	0.0	0.0	0.0
NW	0.0017	0.0055	0.0029	0.0	0.0	0.0
NNW	0.0009	0.0025	0.0014	0.0	0.0	0.0

TABLE A-2

METEOROLOGICAL INPUT DATA FOR THE WINTER SEASON

Stability Class 1

	WINDSPEED CLASS					
WIND DIRECTION	1	2	3	4	5	6
N	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0
SSE	0.0	0.0	0.0	0.0	0.0	0.0
S	0.0	0.0	0.0	0.0	0.0	0.0
SSW	0.0	0.0	0.0	0.0	0.0	0.0
SW	0.0	0.0	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0	0.0	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0
NNW	0.0	0.0	0.0	0.0	0.0	0.0

TABLE A-2 (Continued)

METEOROLOGICAL INPUT DATA FOR THE WINTER SEASON

Stability Class 2

	WINDSPEED CLASS					
WIND DIRECTION	1	2	3	4	5	6
N	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0	0.0	0.0	0.0	0.0	0.0
ENE	0.0005	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	0.0	0.0	0.0
ESE	0.0	0.0	0.0	0.0	0.0	0.0
SE	0.0	0.0	0.0	0.0	0.0	0.0
SSE	0.0	0.0	0.0	0.0	0.0	0.0
S	0.0009	0.0	0.0	0.0	0.0	0.0
SSW	0.0005	0.0	0.0	0.0	0.0	0.0
SW	0.0005	0.0	0.0	0.0	0.0	0.0
WSW	0.0005	0.0	0.0	0.0	0.0	0.0
W	0.0005	0.0	0.0	0.0	0.0	0.0
WNW	0.0005	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0
NNW	0.0	0.0	0.0	0.0	0.0	0.0

TABLE A-2 (Continued)

METEOROLOGICAL INPUT DATA FOR THE WINTER SEASON

Stability Class 3

	WINDSPEED CLASS					
WIND DIRECTION	1	2	3	4	5	6
N	0.0000	0.0005	0.0005	0.0	0.0	0.0
NNE	0.0005	0.0	0.0005	0.0	0.0	0.0
NE	0.0001	0.0009	0.0005	0.0	0.0	0.0
ENE	0.0005	0.0005	0.0009	0.0	0.0	0.0
E	0.0000	0.0005	0.0005	0.0	0.0	0.0
ESE	0.0000	0.0005	0.0	0.0	0.0	0.0
SE	0.0000	0.0005	0.0014	0.0	0.0	0.0
SSE	0.0001	0.0009	0.0	0.0	0.0	0.0
S	0.0005	0.0005	0.0014	0.0	0.0	0.0
SSW	0.0011	0.0009	0.0009	0.0	0.0	0.0
SW	0.0002	0.0018	0.0027	0.0	0.0	0.0
WSW	0.0011	0.0014	0.0009	0.0	0.0	0.0
W	0.0000	0.0009	0.0027	0.0	0.0	0.0
WNW	0.0001	0.0009	0.0018	0.0	0.0	0.0
NW	0.0001	0.0014	0.0009	0.0	0.0	0.0
NNW	0.0007	0.0023	0.0023	0.0	0.0	0.0

TABLE A-2 (Continued)

METEOROLOGICAL INPUT DATA FOR THE WINTER SEASON

Stability Class 4

	WINDSPEED CLASS					
WIND DIRECTION	1	2	3	4	5	6
N	0.0015	0.0100	0.0255	0.0228	0.0009	0.0
NNE	0.0005	0.0050	0.0123	0.0041	0.0	0.0
NE	0.0001	0.0082	0.0087	0.0027	0.0	0.0
ENE	0.0000	0.0032	0.0068	0.0014	0.0	0.0
E	0.0000	0.0032	0.0105	0.0014	0.0	0.0
ESE	0.0010	0.0046	0.0137	0.0064	0.0	0.0
SE	0.0005	0.0059	0.0087	0.0041	0.0	0.0
SSE	0.0010	0.0041	0.0091	0.0055	0.0	0.0
S	0.0015	0.0128	0.0246	0.0132	0.0	0.0
SSW	0.0024	0.0091	0.0150	0.0150	0.0014	0.0005
SW	0.0034	0.0118	0.0219	0.0291	0.0082	0.0014
WSW	0.0011	0.0146	0.0173	0.0314	0.0059	0.0005
W	0.0016	0.0146	0.0392	0.0442	0.0105	0.0009
WNW	0.0006	0.0087	0.0319	0.0364	0.0055	0.0
NW	0.0010	0.0105	0.0250	0.0246	0.0032	0.0
NNW	0.0001	0.0100	0.0114	0.0137	0.0009	0.0

TABLE A-2 (Continued)

METEOROLOGICAL INPUT DATA FOR THE WINTER SEASON

Stability Class 5

WIND DIRECTION	WINDSPEED CLASS 1	2	3	4	5	6
N	0.0014	0.0023	0.0036	0.0	0.0	0.0
NNE	0.0016	0.0036	0.0023	0.0	0.0	0.0
NE	0.0009	0.0023	0.0018	0.0	0.0	0.0
ENE	0.0025	0.0027	0.0046	0.0	0.0	0.0
E	0.0020	0.0064	0.0018	0.0	0.0	0.0
ESE	0.0034	0.0118	0.0009	0.0	0.0	0.0
SE	0.0022	0.0077	0.0014	0.0	0.0	0.0
SSE	0.0018	0.0050	0.0014	0.0	0.0	0.0
S	0.0069	0.0109	0.0032	0.0	0.0	0.0
SSW	0.0051	0.0128	0.0032	0.0	0.0	0.0
SW	0.0104	0.0196	0.0109	0.0	0.0	0.0
WSW	0.0075	0.0077	0.0041	0.0	0.0	0.0
W	0.0022	0.0073	0.0087	0.0	0.0	0.0
WNW	0.0020	0.0027	0.0073	0.0	0.0	0.0
NW	0.0013	0.0082	0.0055	0.0	0.0	0.0
NNW	0.0007	0.0046	0.0014	0.0	0.0	0.0

APPENDIX B

AIR POLLUTION CONTROL LAW

OF THE

COMMONWEALTH OF KENTUCKY

KRS 224.310 TO 224.460 AND 224.991

AIR POLLUTION CONTROL

KRS 224.310 TO 224.460 AND 224.991

224.310 **Definitions**

224.320 **Finding as to necessity for act**

224.330 **Air pollution in violation of standards and rules unlawful**

224.340 **Considerations in fixing standards**

224.350 **Registration of persons whose business contributes to pollution required, when**

224.360 **Regulation of equipment to prevent pollution**

224.370 **Inspection of premises; interference unlawful**

224.380 **Reports and records confidential; limits on use**

224.390 **Orders for cessation of violation; hearings**

224.400 **Emergency orders for abatement**

224.410 **Exemption from regulations; application; granting; limitations on**

224.420 **Air Pollution Control Commission, members, terms, qualifications, compensation, officers, personnel meetings**

224.430 **Powers generally**

224.440 **Co-operation with federal authorities; acceptance of federal funds; recommend projects; administer loans and grants**

224.450 **Jurisdiction ceded to county authority, when**

224.460 **Hearings; appeals, procedure**

224.991 **Penalties for violations**

224.310 Definitions. As used in KRS 224.310 to 224.460 and 224.991, unless the context otherwise requires:

(1) "Department" means the Kentucky State Department of Health;

(2) "Commission" means the Kentucky Air Pollution Control Commission;

(3) "Member" means a member of the Commission;

(4) "Person" or "Persons" means any individual, public or private corporation, political subdivision, government agency, municipality, industry, co-partnership, association, firm, trust, estate, or other entity whatsoever;

(5) "District" means an air pollution control district as provided for in KRS Ch. 77;

(6) "Air pollution" is presence in the outdoor atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as is or threatens to be injurious to human, plant, or animal life, or to property, or which unreasonably interfere with the comfortable enjoyment of life or property;

(7) "Air contaminant" includes smoke, dust, soot, grime, carbon, or any other particulate matter, radioactive matter, noxious acids, fumes, gases, odor, vapor, or any combination thereof;

(8) "Air contaminant source" is any and all sources of emission of air contaminants, whether privately or publicly owned or operated. Without limiting the generality of the foregoing, this term includes all types of business, commercial and industrial plants, works, shops, and stores, and heating and power plants and

stations, buildings and other structures of all types, including single and multiple family residences, apartments, houses, office buildings, public buildings, hotels, restaurants, schools, hospitals, churches, and other institutional buildings, automobiles, trucks, tractors, buses and other motor vehicles, garages and vending and service locations and stations, railroad locomotives, ships, boats and other waterborne craft, portable fuel-burning equipment, incinerators of all types, indoor and outdoor, refuse dumps and piles, and all stack and other chimney outlets from any of the foregoing. (1966, c. 22, § 1)

224.320 Finding as to necessity for act. The Kentucky General Assembly hereby finds that it is necessary to the health and welfare of the citizens of Kentucky that there be maintained at all times both now and in the future a reasonable degree of purity of the air resources of this Commonwealth consistent with maximum employment and full industrial development necessary for the protection of the public health, the general welfare, and the property and people in this Commonwealth; and foster the comfort and convenience of its inhabitants and facilitates the enjoyment of the natural attractions of the state. (1966, c. 22, § 1A)

224.330 Air pollution in violation of standards and rules unlawful. It shall be unlawful for any person, directly or indirectly, to emit into or discharge into the air under the jurisdiction of the Commonwealth, or to cause, permit, or allow to be emitted or discharged into such air any contaminants as provided for in subsection (7) of KRS 224.310 that shall cause or contribute to the pollution of the air of the Commonwealth in contravention of the emission standards or the ambient air standards adopted by the commission, or in contravention of any of the rules, regulations, or orders of the commission, or in contravention of any of the provisions of KRS 224.310 to 224.460 and 224.991. (1966, c. 22, § 5)

224.340 Considerations in fixing standards. In exercising the power conferred upon it by this chapter the commission shall give due recognition to the policy as heretofore expressed in paragraph 1 of the preamble. The commission, in fixing standards, shall require the use of all available, practical, and reasonable methods to prevent and control air pollution in the Commonwealth of Kentucky. It shall give due recognition to the quantity or characteristics of air contaminants or the duration of their presence in the atmosphere. It shall take into consideration in this connection such factors, among others, found by it to be proper and just, existing physical conditions, public benefit, that the degree of conformance therewith that may be proper as to an essentially residential area of the state may not be proper as to a highly industrial area of the state, and, further, the relationship between the intensity and composition of air pollution and the health of the public and damage to or interference with enjoyment of property. It shall give reasonable consideration to the interests of all parties concerned. (1966, c. 22, § 6)

224.350 Registration of persons whose business contributes to pollution required, when. Persons engaged in operations which the commission finds may result in air pollution, shall if so required by regulation, register with the commission and file with the commission reports containing information as to location, size, and height of pollutant outlet, rate, duration, and composition of pollutant emission, provided for by regulation pursuant to subsection (10) of KRS 224.430, and such other information as the commission may require. (1966, c. 22, § 7)

224.360 Regulation of equipment to prevent pollution. (1) The commission may, by regulation, prohibit the installation, alteration, or use of any machine, equipment, device or other article which it finds may cause or contribute to air pollution or is intended primarily to prevent or control the emission of air pollutants, unless a permit therefor has been obtained from the commission.

(2) The commission may require that applications for such permits shall be accompanied by plans, specifications, and such other information as the commission deems necessary.

(3) The commission, by rules and regulations, shall provide for the issuance, suspension, revocation, and renewal of any permits which it may require pursuant to this section. (1966, c. 22, § 8)

224.370 Inspection of premises; interference unlawful. Any duly authorized officer, employe, or representative of the commission may enter and inspect any property, premise, or place at any reasonable time for the purpose of investigating either an actual or suspected source of air pollution or of ascertaining the state of compliance with KRS 224.310 to 224.460 and 224.991 and regulations enforced pursuant thereto. No person shall refuse entry or access to any authorized representative of the commission who requests entry for purposes of inspection, and who presents appropriate credentials; nor shall any person obstruct, hamper, or interfere with any such inspection. (1966, c. 22, § 9)

224.380 Reports and records confidential; limits on use. Any records or other information furnished to or obtained by the commission concerning one or more air pollution sources, which records or information relate to processes or production unique to the owner or operator or which would tend to affect adversely the competitive position of such owner or operator, shall be only for the confidential use of the commission and other departments, agencies and officers of the state government, unless such owner or operator shall expressly agree to their publication or availability to the general public. Nothing herein shall be construed to prevent the use of such records or information by any department, agency or officer of the state government in compiling or publishing analyses or summaries relating to the general condition of the outdoor atmosphere, provided that such analyses or summaries do not identify, directly or indirectly, any owner or operator or reveal any information otherwise confidential under this section. (1966, c. 22, § 10)

224.390 Orders for cessation of violation; hearings. (1) Whenever the commission has reason to believe that a violation of any provision of KRS 224.310 to 224.460 and 224.991 or rule or regulation pursuant thereto has occurred it may cause written notice to be served upon the alleged violator or violators. The notice shall specify the provision of KRS 224.310 to 224.460 and 224.991 or rule or regulation alleged to be violated, and the facts alleged to constitute a violation thereof, and may order that necessary corrective action be taken within a reasonable time. Any such order shall become final unless, no later than thirty days after the date such order is served, the person named therein request in writing a hearing before the commission. In lieu of such order, the commission may require that the alleged violator or violators appear before the commission for a hearing at a time and place specified in the notice and answer the charges complained of, or the commission may initiate appropriate legal action pursuant to KRS 224.991.

(2) After such hearing, the commission shall affirm, modify, or rescind its order or issue an appropriate order or orders for the prevention, abatement, or control of the air pollution involved. Such orders shall prescribe the date or dates by which the violation or violations shall cease and may prescribe timetables for necessary action in preventing, abating, or controlling the air pollution.

(3) Nothing in KRS 224.310 to 224.460 and 224.991 shall prevent the commission from making efforts to obtain voluntary compliance through warning, conference, or any other appropriate means. (1966, c. 22, § 11)

224.400 Emergency orders for abatement. Notwithstanding the provisions of KRS 224.310 to 224.460 and 224.991 or any other provisions of law, if the executive secretary finds that any person is causing or contributing to air pollution and that such pollution creates an emergency which requires immediate action to protect the public health or safety, he shall order with written notification to the Governor, such person to reduce or discontinue immediately the air pollution. Upon issuance of any such order the executive secretary shall fix a place and time, not later than 24 hours thereafter, for a hearing to be held before the commission. Not more than 24 hours after the conclusion of such hearing, and without adjournment thereof, the commission shall affirm, modify, or set aside the order of the executive secretary. (1966, c. 22, § 12)

224.410 Exemption from regulations; application; granting; limitations on. (1) Any person who owns or is in control of any plant, building, structure, process or equipment may apply to the commission for an exemption or partial exemption from rules or regulations that may be promulgated under KRS 224.310 to 224.460 and 224.991 governing the quality, nature, duration, or extent of discharges of air pollutants. The application shall be accompanied by such information and data as the commission may require. The commission may grant such exemption or partial exemption if it finds that:

(a) The discharges occurring or proposed to occur do not constitute a danger to public health or safety; and,

(b) Compliance with the rules or regulations from which exemption is sought would produce serious hardship without equal or greater benefits to the public.

(2) No exemption or partial exemption shall be granted pursuant to this section except after public hearing on due notice and until the commission has considered the relative interests of the applicant, other owners of property likely to be affected by the discharges, and the general public.

(3) No exemption or partial exemption pursuant to this section shall be granted for a period to exceed one year, but any such exemption or partial exemption may be renewed for like periods if no complaint is made to the commission on account thereof or if, such complaint having been made and duly considered at a public hearing held by the commission on due notice, the commission finds that renewal is justified. No renewal shall be granted except on application therefor. Any such application shall be made at least thirty days prior to the expiration of the exemption or partial exemption. Immediately prior to application for renewal the applicant shall give public notice of such application in accordance with rules and regulations of the commission. Any renewal pursuant to this subsection shall be on the same grounds and subject to the same lim-

itations and requirements as provided in subsection (1) of this section.

(4) **An exemption,** partial exemption, or renewal thereof shall not be a right of the applicant or holder thereof but shall be in the discretion of the commission. However, any person adversely affected by an exemption, partial exemption, or renewal granted by the commission may obtain judicial review thereof by a proceeding in the Franklin Circuit Court.

(5) Nothing in this section and no exemption, partial exemption, or renewal granted pursuant hereto shall be construed to prevent or limit the application of the emergency provisions and procedures of KRS 224.400 to any person or his property. (1966, c. 22, § 13)

224.420 Air Pollution Control Commission, members, terms, qualifications, compensation, officers, personnel meetings. (1) There is hereby created in the Department of Health, a Kentucky State Air Pollution Control Commission which shall consist of five governmental members and six public members appointed for terms of four years each by the Governor.

(2) (a) The governmental members shall be the Commissioner of Health, the Commissioner of Commerce, the Attorney General, the Commissioner of Natural Resources, and the Commissioner of Agriculture.

(b) Of the six public members, one shall be a member of the general public. Of the remaining five members, three members shall be representative of industry and shall be experienced and competent in matters of air pollution control. At least one of the three members shall be a licensed professional engineer, trained and experienced in matters of air pollution control. The two remaining members shall be (a) representative of an air pollution control district, as created and defined in KRS Ch. 77, and (b) a representative from the University of Kentucky, College of Engineering, experienced and competent in matters of air pollution control.

(c) Vacancies shall be filled for the unexpired portion of any term in the same manner as an original appointment. Each of the officers of the Commonwealth hereby made a member of the commission, may, by written order filed with the secretary of the commission, designate a deputy in his department to serve in his stead and to perform his duties as a member of the commission in his absence.

(3) No salary or other compensation shall be allowed any member of the commission for services as such member but each member may be reimbursed for actual and necessary expenses incurred in the performance of its official duties.

(4) The commission shall select one of its members as chairman and another as vice-chairman at its first regular meeting in the calendar year. The chief engineer of the State Department of Health shall be the executive secretary of the commission and as such its chief executive officer. The Commissioner of Health shall employ such technical and other personnel as may be required in order to carry out the provisions of KRS 224.310 to 224.460, 224.991 and the policies of the commission, and may define their powers and duties, and fix their compensation subject to the provisions of KRS Chapter 18. The executive secretary may perform, in the name of the commission, such functions and duties and may exercise such authority of the commission as the commission may delegate to him. The executive secretary, with the approval of the commission, may designate one or more assistants to act in his place when absent or unable to perform his duties.

(5) The commission may request and receive the assistance of any state or municipal educational institution, experiment station, laboratory, or other agency when it is deemed necessary or beneficial by the

commission to carry out the provisions of KRS 224.310 to 224.460 and 224.991.

(6) The commission shall hold regular meetings at least once in every three months, the time and place of which shall be determined by the commission. Special meetings may be called by the chairman or by three members of the commission by delivery to the office of each member of the commission of a written notice thereof at least five days in advance of the date of any such meeting. Seven members of the commission shall constitute a quorum at any meeting. The commission shall establish bylaws for the conduct of its meeting and shall keep an accurate record of all its proceedings. (1966, c. 22, § 2)

224.430 Powers generally. In addition to any other powers vested in it by law the commission shall have power to:

(1) Issue, amend, and repeal rules and regulations consistent with KRS 224.310 to 224.460 and 224.991.

(2) Hold hearings, relating to any aspect of or matter in the administration of KRS 224.310 to 224.460 and 224.991, and in connection therewith, compel the attendance of witnesses and the production of evidence.

(3) Issue such orders as may be necessary to effectuate the purposes of KRS 224.310 to 224.460 and 224.991 and enforce the same by all appropriate administrative and judicial proceedings.

(4) Require the maintenance and availability of records relating to operations which may cause or contribute to air pollution.

(5) Secure necessary scientific, technical, administrative, and operational services, including laboratory facilities, by contract or otherwise.

(6) Prepare and develop a comprehensive plan or plans for the prevention, abatement, and control of air pollution in this state.

(7) Collect and disseminate information and conduct educational and training programs relating to air pollution.

(8) Advise, consult, and cooperate with other agencies of the state, subdivisions, industries, other states, interstate, interlocal agencies, and with interested persons or groups.

(9) Accept, receive, and administer grants or other funds or gifts from public and private agencies including the Federal Government for the purpose of carrying out any of the functions of KRS 224.310 to 224.460 and 224.991. Such funds received by the commission pursuant to this section shall be deposited in the state treasury to the account of the commission.

(10) To establish, modify, or amend after public hearings, ambient air standards, and emission standards of various air pollutants from any source whatsoever for the purpose of KRS 224.310 to 224.460 and 224.991.

(a) Except as otherwise provided in or pursuant to KRS 224.310 to 224.460 and 224.991, such levels, concentrations, or quantities shall be controlling throughout the state and no emission in excess of the emission standards shall be lawful.

(b) In any area where the concentration of air pollution sources or of population, or of where the nature of the economy or of land and its uses so require, the commission may fix more stringent requirements governing the emission of air pollutants than those in effect pursuant to paragraph (a), of this section.

(11) To adopt, after hearing, such general rules and regulations pertaining to the prevention, abatement and control of existing or threatened pollution as the commission may deem necessary to the accomplishment of the purposes of KRS 224.310 to 224.460 and 224.991.

(12) To adopt, without hearing, rules and regulations with respect to the procedural aspects of hearings, the filing of reports and orders, the issuance of permits and all other matters not specifically requiring public hearing. (1966, c. 22, § 4)

224.440 Co-operation with federal authorities; acceptance of federal funds; recommend projects; administer loans and grants. The Air Pollution Control Commission is hereby authorized to take all action necessary or appropriate to secure to this State the benefits of any existing or future Acts of the United States Congress and to carry out the administration and directives of such Acts. In carrying out the purposes of this section, the commission, in addition to any other action that may be necessary or appropriate, is authorized:

(1) To co-operate with the United States Public Health Service and other agencies of the federal government, other states, inter-state agencies, municipalities within the Commonwealth and other interested parties in all matters relating to air pollution.

(2) On behalf of this Commonwealth to apply for and receive such funds as are now or may be available to the commission under the aforesaid existing or future federal legislation from any agency of the federal government; provided, that all monies received from any federal agency as herein provided shall be paid into the State Treasury and shall be expended, under the direction of the commission, solely for the purpose or purposes for which such federal monies have been made available.

(3) To review and make recommendations, and to establish priorities as may be appropriate for all projects for which application for loans or grants under the aforesaid federal legislation is made by any municipality or any agency, subagency, or subdivision of government existing now or hereafter created in this state.

(4) To accept and administer loans and grants from other sources, public or private, for the carrying out of any of the functions here set forth, which loans and grants shall not be expended for other than the purposes for which provided. (1966, c. 22, § 3)

224.450 Jurisdiction ceded to county authority, when. (1) Each county which pursuant to the provisions of KRS Ch. 77 has established or subsequent to the enactment of KRS 224.310 to 224.460 and 224.991 will establish a local Air Pollution Control Program, shall submit a synopsis of said program together with such standards and procedures as are enacted by regulation to the state department for approval within a period of ninety days from the enactment hereof, or a period of ninety days of the establishment of said local program.

(2) If, after review by the commission it is determined that the county in question has established an Air Pollution Control Program meeting state regulatory standards in the area to which such program relates, and that such program will be administered in a manner consistent with the objectives of KRS 224.310 to 224.460 and 224.991 the jurisdiction for the purposes of KRS 224.310 to 224.460, and 224.991 shall be ceded to the administrative agency for the local program, provided, however, that the commission may reassume said jurisdiction when after formal hearing it is determined that the local program is not meeting the state standards. (1966, c. 22, § 14)

224.460 Hearings; appeals, procedure. (1) The hearing provided for in KRS 224.390 may be conducted by the commission at a regular or special meeting or may be conducted by a hearing officer appointed by the commission to serve in its place. Such a hearing shall be conducted in the name of the commission at any time or place specified by it. Said hearing officer may be a full-time employe, serve by contract, or paid upon a per diem basis in the discretion of the commission.

(2) Appeals may be taken from all orders of the commission. Such appeals shall be taken within thirty days from the rendition of such order to the Frank-

lin Circuit Court or a county circuit court of a county affected by the order. The party or parties affected by the order shall file in the circuit court a petition which states fully the grounds upon which a review is sought and assign all errors relied on. The commission shall be named respondent, and service shall be had on the executive secretary. Summons shall issue upon the petition directing the commission to send its entire original record, properly bound, to the clerk of the circuit court after certifying that such record is its entire original record, which shall be filed by the clerk of the circuit court and such record shall then become and be considered by the circuit court on the review. After the case has been properly docketed in the circuit court, any party directly affected by the issues on appeal, may, upon notice to the parties and upon proper showing and in the discretion of the court, be permitted to intervene. Upon hearing of the appeal the findings of the commission shall be prima facie evidence of the facts found therein. The court shall review the entire record and the findings and order of the commission and shall receive such new evidence as may be offered to it.

(3) Appeals to the Court of Appeals from orders of the circuit court, shall be taken in the manner provided in the Kentucky Rules of Civil Procedure. (1966, c. 22, § 16)

PENALTIES

224.991 Penalties for violations. (1) Any person who willfully violates any of the provisions of KRS 224.310 to 224.460 and 224.991 or who willfully fails to perform any duties imposed by those sections, or who willfully violates any determination or order of the commission promulgated pursuant to KRS 224.430, 224.390 or 224.400 shall be liable to a civil penalty of not to exceed the sum of one thousand dollars for said violation, and an additional civil penalty of not to exceed one thousand dollars for each day during which such violation continues, and in addition, may be enjoined from continuing such violation as hereinafter provided in this section. Such penalties shall be recoverable in an action brought in the name of the Commonwealth of Kentucky by the Attorney General.

(2) It shall be the duty of the Attorney General, upon the request of the commission, to bring an action for the recovery of the penalties hereinabove provided for, and to bring an action for an injunction against any person violating or threatening to violate any provision of KRS 224.310 to 224.460 and 224.991 or violating or threatening to violate any order or determination of the commission promulgated pursuant to KRS 224.430, 224.390 or 224.400. In any such action any finding of the commission shall be prima facie evidence of the fact or facts found therein.

(3) Any person who shall willfully violate any of the provisions of KRS 224.310 to 224.460 and 224.991 or any determination or order of the commission promulgated pursuant to those sections which has become final shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not less than one hundred dollars nor more than one thousand dollars, or by imprisonment for a term of not more than one year or by both fine and imprisonment for each separate violation. Each day upon which such violation occurs shall constitute a separate violation.

(4) The authority herein vested in the Attorney General, upon request of the commission, to bring actions for injunctions for violations of KRS 224.310 to 224.460 and 224.991 or of any regulation, or order issued thereunder, shall be exclusive. Nothing herein contained shall abridge the right of any person to recover actual compensatory damages resulting from any such violation. (1966, c. 22. § 17)

APPENDIX C

REGIONAL ORGANIZATIONAL STRUCTURE

PURPOSE OF REGIONAL EXAMINATION

An effective air pollution control program must be based on a complete technical evaluation of the conditions in the control area. This evaluation is necessary but not in itself sufficient. The question of political control and administration of the control agency among and within the various jurisdictions is also vital to the development of a functioning program.

Two closely related problems had to be resolved for this Implementation Plan with regard to the acceptability on a political level of its recommendations for an air pollution control regional organization:

1. The MCIAQCR overlaps three states; Ohio, Kentucky, and Indiana, with a total of nine counties in the three states. Instead of one authority which could impose an implementation plan on subordinate political subdivisions, this study dealt with three independent sovereign states. Agreement to cooperate had to be obtained, with no single authority that could force consent.
2. Each part of the MCIAQCR is located in two distinct areas, its state and the region. NAPCA understandably is looking primarily toward a regional plan, because MCIAQCR is one airshed. Each state, however, looks upon its portion of the region as simply a part of the state. Each state board has state-wide responsibility for air quality. The two, three, or four counties of the state which happen to be located in the region are no different, in the eyes of each state board, than any other counties in the state.

These basic problems had been anticipated in the development of the Plan. A methodology was developed by which various organizational alternatives could be tested (Section 3.3). This procedure was carried out to insure that completed Implementation Plans would be both technically and politically feasible.

ORGANIZATIONAL ALTERNATIVES

Four organizational alternatives were considered in performing the political acceptability analysis:

1. Interstate Compact. All control agency functions would be delegated by the states with Federal approval to a central interstate agency.
2. Interstate Agreement. All of the program except legal enforcement, which would be retained by the states, would be handled by an interstate agency. This organization avoids the need for Congressional approval of a compact.
3. Intrastate Enforcement with a Central Cooperating Mechanism. Basic control authority and operations are retained at the state level.
4. County Enforcement with a Central Cooperating Mechanism.

Each of the above, except the compact, provided a number of suboptions which had to be considered. A description of these four basic plans, including legal considerations and the organization's function in the control of emergency episodes was prepared.

These four alternatives were selected to represent possible methods of controlling and administering an air pollution control program in the MCIAQCR. The following analytic effort was undertaken to determine which of these alternatives would be most appropriate in terms of citizen and political acceptance within the Region.

ANALYSIS

In order to determine which of the above alternatives would best meet the needs of the MCIAQCR, it was necessary to present them to a cross-section of area citizens and leaders. A seminar technique was utilized for this purpose since a full explanation of the various organizations could be presented. The seminar also provided a forum for discussion and comments regarding the various alternatives. A seminar was scheduled for each of the three states and a group consisting of members of the state legislature, the state air pollution control board, city officials, and concerned citizens was invited to attend. The seminar plan provided for a morning session in which the alternatives, including their legal implications and plans for emergency episode control were explained. Following lunch, the study team answered questions from the participants and generally noted the reactions to the proposals, and thus got a feedback as to what was considered to be the most acceptable organizational alternative.

The Ohio Seminar was held on April 3, 1970 at the Holiday Inn, Downtown, Cincinnati and although attendance was somewhat below expectations, the meeting was considered to be a success. The participants did react and did provide the staff with clear ideas concerning their views on what was acceptable. To verify whether or not this reaction represented also the feeling of concerned legislative leaders, one staff member met separately with selected legislators.

The substance of the Ohio reaction was that Ohio's agreement to an interstate compact was contingent upon agreement by the other states. The general consensus was that a plan for intrastate enforcement by the state board would be preferred.

The next seminar, scheduled for April 17, 1970 in Indiana, had a substantially larger guest list than that for Ohio. However, in spite of this larger list of invitees, practically no reservations were received even in response to telephone followup. The meeting was therefore canceled. The reasons appeared to be most important: (1) a conflict of dates with another meeting, and (2) indifference to the interstate aspects of air pollution control. Only two small Indiana counties are included in the MCIAQCR, with a total population of 30,000. Other Indiana and Kentucky counties contiguous to these counties are essentially rural, with no serious pollution problems. Furthermore, the state board had been reasonably active for some time, and apparently was thought to be equal to the task.

The Kentucky meeting, April 24, 1970 at the Holiday Inn in Covington, produced a turnout of 50, plus staff. This turnout resulted from several causes: (1) a high level of interest in pollution control, (2) an expanded list of invitees; and (3) inclusion of Indiana residents who had been interested in a meeting, but had not been able to attend when originally scheduled.

The same format was followed as at the Ohio meeting, but with a larger audience, greater participation resulted. The message was unmistakable. Kentucky was proud of its control program, and wanted no part of a compact or any other device that might dilute the authority and responsibility of the State Board. The audience was virtually unanimous in insisting on a state program (alternative 3), with a willingness to cooperate with other states provided this cooperation did not dilute state responsibility. The Indiana citizens shared the Kentucky viewpoint.

The basic objective of this phase of the analysis was thus satisfied with the identification of intrastate control programs with some interstate cooperation as the desired organizational form.

Nevertheless, the two meetings had come to grips only with the basic plan. Assuming control by the state boards in their receptive areas, two questions remained:

1. To what extent, and in what areas, would there be cooperation among the states?
2. Through what mechanism would this cooperation be exercised?

To resolve these problems, a third meeting was called, this time limited to representatives of the three state boards, the City of Cincinnati, one concerned legislator, and representatives of the Ohio-Kentucky-Indiana Regional Planning Authority, the recognized planning agency for the nine counties of the MCIAQCR.

The various representatives quickly agreed that cooperation was necessary. They pointed out that for many months, they had cooperated through an ad hoc device known as the Air Pollution Control Officers Committee.

They also agreed that, to the extent interstate planning would be needed after implementation, this would require an interstate mechanism.

As a group, the meeting failed to define any role for the OKI Regional Planning Authority. This perhaps came about because of the existence of one well-established agency, the City of Cincinnati, in the heart of the region. The City, as will be described more fully in sections 5 and 8 of this report, is recommended as the agent of the State of Ohio under contract for air quality control in the four Ohio counties. It has expertise. It also has a powerful data processing unit, with ample capacity to serve as the regional data bank. The consensus was that the City of Cincinnati agency is a more logical data bank, so that this data can be most useful particularly in emergency episode control.

ORGANIZATIONAL RECOMMENDATIONS

The seminars indicated which of the various organizational alternatives would be politically viable in the MCIAQCR. Based on the procedure described above, the following general recommendations are presented. (Sections 3, 6, 7, describe in some detail how these recommendations are to be implemented.)

1. Responsibility for air quality control in the MCIAQCR should be lodged in the respective state boards.
2. The Ohio and Kentucky boards should establish district offices within the region, with appropriate staff. Indiana should continue to operate from its present headquarters in Indianapolis.
3. Ohio can best develop a capability by contracting with the City of Cincinnati and other municipal air pollution control agencies to service the four Ohio counties.
4. Coordination of efforts among the three states should be achieved as follows:
    a. The City of Cincinnati, as part of its contract with the Ohio Board, should assume responsibility for maintaining a regional data bank.
    b. The existing Air Pollution Control Officers Committee should continue its existence as a cooperation mechanism.
    c. This Committee should establish its meeting place in the offices of the OKI Planning Authority. The staff of the Planning Authority should be used for staff to the Committee when necessary. Whenever interstate planning or any other unforeseen studies are necessary, the staff of the Planning Authority should be used.
    d. While responsibility for air pollution control rests with the three respective boards, the OKI Regional Planning Authority board is the only existing mechanism for bringing together the elected officers of the counties comprising MCIAQCR. As such, this board could be used as necessary by the state boards as a means of determining local attitudes.
5. Financing of air quality control is a matter for each state board.

EPISODE ORGANIZATION

The Air Pollution Control Officers Committee will have overall responsibility for promoting interstate planning for air pollution episodes. Because the Committee will have numerous, diverse responsibilities, a separate, subordinate organization is expressly recommended for episode planning purposes. This organization will be called the Region Episode Board. The Board will be comprised of one member from each state in the MCIAQCR. It is possible that members of the Committee may serve as members of the Episode Board. Alternatively, a member from the state agency expressly responsible for state episode planning may be a superior candidate for the Board position.

The Board will have planning and operating responsibilities. During the first few years, the Board will be responsible for developing episode avoidance procedures for the Region. Such procedures are briefly outlined in Section 5 of this report. The board will also assume limited responsibilities for actions during episodes. The actions will be in the form of recommendations to each state at the more severe stage of an episode (i.e., actions which have interstate consequences such as restrictions on automobile travel or shutdown of commercial business activity).

The Board will routinely (e.g., bi-monthly) neet to perform the necessary planning functions. During episodes, the Board will conduct emergency meetings when the Alert stage is reached.

The Board will meet in the office of the OKI Planning Authority for routine meetings. Meetings during episodes will be held at the office of the City of Cincinnati air pollution agency or , when developed, the Ohio District Office for the MCIAQCR.

Staff members from the three states will be used to coordinate and conduct background studies for the purpose of developing an Emergency Episode Plan. When possible, members of the OKI staff will also participate.

See Section 5.1.1 for further discussion on the MCIAQCR Episode Organization.

One regional Emergency Operations Control Center (EOCC) will serve the MCIAQCR. The required facilities will be located in the City offices in downtown Cincinnati, Ohio.

The routine operation of the EOCC will be conducted by the City of Cincinnati staff. During non-episode periods, such operations are minimal. The routine watch of air quality and meteorological conditions will be a part-time responsibility of one of the professional staff. Under normal conditions there will be no extensive distribution of air quality or meteorlogical data to any of the state organizations.

The presently active Air Pollution Control Officers Committee will have overall responsibility for promoting interstate planning for air pollution episodes. The Committee will have planning responsibilities during non-episode periods and will participate in decision-making operations during episodes. During an 18 month period after the submission of the Implementation Plan, the Committee will be responsible for developing episode alert procedures for the Region. Such procedures are briefly outlined in Section 5 of this report. The Committee will routinely meet to perform the necessary planning functions. Such meetings will be held at the EOCC.

The manner in which the members of the Committee organize during episodes is dependent upon the size of the geographical area affected by the episode. There are essentially two distinct cases; localized episodes and regionwide episodes. Under both situations, all surveillance information will be received and evaluated by the MCIAQCR EOCC. In the case of a localized episode (i.e., an episode which affects a part of one state), the control officers will communicate via telephone; but episode actions will be taken only by the control official in the state affected. When a regionwide episode occurs, the members of the Committee will meet at the MCIAQCR EOCC to plan unified actions.

The episode organization for the MCIAQCR will operate effectively because of uniformity of episode criteria and control actions by the states. The combined air quality monitoring networks of the three states involved will effectively serve the EOCC.

Staffing and funding the EOCC by the three states is a consideration that will be resolved by the Air Pollution Control Officers Committee. Naturally, each state will contribute agency personnel to help run the EOCC during episodes. The size of the staff and procedures followed will be determined by the Committee and published in the Standing Operating Procedures for the EOCC.

EXISTING INTERSTATE COOPERATION

Representatives of the governmental jurisdictions encompassed by the MCIAQCR are acutely aware of the necessity for a coordinated program to control air pollution in the Region. Following the designation of the Metropolitan Cincinnati Interstate Air Quality Control Region, an Air Pollution Control Officers Committee was formed for the Region. Following are excerpts from the document which established the Metropolitan Cincinnati Interstate Air Quality Control Region Air Pollution Control Officers Committee.

> . . . This document, concurred in by representatives of the air pollution control agencies of the States of Ohio and Indiana, the Commonwealth of Kentucky, and the City of Cincinnati, Ohio, is designated to set forth basic policies of interjurisdictional cooperation in the area designated by the Secretary of Health, Education and Welfare as the Metropolitan Cincinnati Air Quality Control Region (hereinafter referred to as the "Region"). The purpose of this document is to establish a flexible mechanism whereby the control officers within the Region can readily exchange information and data of common interest, and coordinate, insofar as possible, each other's control programs so as to achieve optimum utilization of data and avoid unnecessary expense and duplication of effort. This document is intended to set forth an informal arrangement by and between the control officers of the aforesaid agencies, and the policies expressed herein should not be construed to be official policy of any of the control agencies represented.
>
> Policies and Procedures
>
> I. Name: The organization shall be known as the Metropolitan Cincinnati Interstate Air Quality Control Region - Air Pollution Control Officers Committee (hereinafter referred to as the "Committee").
>
> II. Membership: Representatives of the following governmental air pollution control agencies shall be members of the Committee:
>
> The State of Ohio
> The State of Indiana
> The Commonwealth of Kentucky

The City of Cincinnati, Ohio

III. Designated Representatives: For purposes of giving notice, meetings, exchanging data and other pertinent information, etc., the following are designated as the Representatives for each respective control agency:

The State of Ohio -

The State of Indiana -

The Commonwealth of Kentucky -

The City of Cincinnati, Ohio -

IV. Federal Representation: Due to the impact of the Air Quality Act on the control efforts of the various agencies having jurisdiction within the Region, and the desire of the representative control officers to be informed of federal activities and available technical assistance which may inure to each other's benefit, it is felt that federal representation on the Committee would be appropriate and advantageous. Therefore, it is mutually agreed that an official of the National Air Pollution Control Administration shall be invited to attend and participate in all activities of the Committee, such official's name upon designation to be appended to this document.

V. Organization, Meetings, Minutes:

A. Organization - The organizational conduct of the Committee meetings shall be as informal as possible. The Committee shall have no permanent chairman or secretary, but shall, at the discretion of the members, delegate such responsibilities and duties in an equitable manner.

B. Meetings - It is felt that the purposes of the Committee can, for the most part, be achieved by routine correspondence and telephone communications. Therefore, the Committee shall have no regularly scheduled meetings, but shall meet at a mutually agreeable time and place on the call of one of the members when matters of importance arise.

C. Minutes - Minutes of Committee meetings shall be recorded and distributed to the members by the person designated as the secretary for the meeting.

VI. Program Coordination: The representative control officers will attempt, insofar as possible, to establish program efforts within the Region consistent with the following practices and procedures:

A. Reference System - Data points shall be keyed to the Universal Transverse Mercator System referenced to principal coordinates of 39° 12' 30" latitude, and 84° 27' 30" longitude, which locate a central point in the Region in the vicinity of U. S. Interstate I-75 and Amity Road, Cincinnati, Ohio. Graphic presentations of data using a grid system shall be consistent with Universal Transverse Mercator System, with grid size, depending on need, ranging from one to twenty-five square kilometers.

B. Air Quality Monitoring - Preferred general practices for air quality monitoring shall be determined by the Designated Representatives for:

1. Equipment
2. Sampling Schedules
3. Laboratory Procedures
4. Data Reporting Factors

C. Emission Information - Point source emission data shall, insofar, as practicable, be obtained and reported in a consistent manner.

VII. Exchange of Information: It is the intention of the Committee members that information and data of common interest should be freely exchanged between the representative control agencies. Such exchange shall be directed to the Designated Representative for each respective control agency. Without limiting the scope of exchange, the following matters will form the basis of interjurisdictional exchange of information and data:

A. Legislative and Administrative: The representative control agencies shall exchange copies of enabling legislation, adopted regulations or ordinances, annual reports, and any other pertinent information relative to control activities within the Region.

B. Proposed Standards - The representative control agencies shall forward prior to publication copies of proposed ambient air quality and emission standards applicable to any portion of the Region for the Committee member's review and comment. Notice of any public hearings held relative to the adoption of said standards shall be given the Committee through each control agency's Designated Representative.

C. Air Quality Monitoring Data - The representative control agencies shall exchange summary tabulations of air quality monitoring results for each agency's jurisdiction on a periodic basis as such summaries become available.

D. Source Emission Data - Insofar as consistent with the confidentiality requirements of each control agency's enabling legislation, specific point source emission information shall be available for any Committee member's review in the offices of the agency possessing such information. Mass emission data not making specific reference to any particular plant or industry will be freely exchanged between the Committee members through the Designated Representatives.

VIII. Expression of Intent: The undersigned hereby witness that they concur with the aforesaid purposes and objectives, and that they recognize the desirability and indeed the necessity of coordination of technical matters in interstate areas of joint interest and concern. It is understood that no legal liabilities or other binding committments are hereby made, but that a positive intent for cooperation in all the above matters is expressed .

/s/ Samuel I. Lord, Jr. 11/10/69
Kentucky Air Pollution Control Comm.

/s/ A. C. Offutt, M.D. 11/25/69
Indiana Air Pollution Control Board

/s/ E. W. Arnold, M. D. 12/69

Ohio Air Pollution Control Board

/s/ R. L. Krabach 12/69

City of Cincinnati Air Pollution
Control Board

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15. Supplementary Notes

16. Abstracts

Contents include: description of the region; control plan; legal authority; control regulations; emergency episode authority and procedures; air quality monitoring; and resources. Meteorological data, the Kentucky Air Pollution Control Law, and regional organizational structures are appended.

17. Key Words and Document Analysis. (a). Descriptors

Air pollution
Urban areas
Aerosols
Dust
Sulfur oxides
Regulations
Monitors
Environmental surveys
Abatement
Resources
Manpower
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Atmospheric diffusion
Mathematical models
Optimization

17b. Identifiers/Open-Ended Terms
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